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**Department of Defense  
Fiscal Year (FY) 2021 Budget Estimates**

February 2020



**Air Force**

*Justification Book Volume 2 of 3*

***Research, Development, Test & Evaluation, Air Force***

**Vol-II**

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Air Force • Budget Estimates FY 2021 • RDT&E Program

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## Fiscal Year (FY) 2021 Budget Estimates RDT&E Descriptive Summaries Budget Activities February 2020

### INTRODUCTION AND EXPLANATION OF CONTENTS

#### GENERAL

- This document has been prepared to provide information on the United States Air Force (USAF) Research, Development, Test and Evaluation (RDT&E) program elements and projects in the FY 2021 President's Budget (PB).
  - All exhibits in this document have been assembled in accordance with DoD 7000.14R, Financial Management Regulation, Volume 2B, Chapter 5.
  - Other comments on exhibit contents in this document:
    - Exhibits R-2/2a and R-3 provide narrative information for all RDT&E program elements and projects within the USAF FY 2021 RDT&E program with the exception of classified program elements. The format and contents of this document are in accordance to the guidelines and requirements of the Congressional committees in so far as possible.
    - The "Other Program Funding Summary portion of the R-2 includes, in addition to RDTE& funds, Procurement funds and quantities, Military Construction appropriation funds on specific development programs, Operations and Maintenance appropriation funds where they are essential to the development effort described, and where appropriate, Department of Energy (DOE) costs.

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### CLASSIFICATION

- All exhibits contained in Volumes I, II, and III are unclassified. Classified exhibits are not included in the submission due to the level of security classification and necessity of special security clearances.

### RDT&E, Air Force Overseas Contingency Operations (OCO)

- FY2021 OCO can be separated into the following categories:
  - OCO for Direct War Costs: Direct War costs are those combat or direct combat support costs that will not continue to be expended once combat operations end at major contingency locations.
  - OCO for Enduring Requirements: OCO for Enduring Requirements are enduring in-theater and in-CONUS costs that will likely remain after combat operations cease, and have previously been funded in OCO.
  - OCO for Base Requirements: OCO for Base Requirements is OCO funding for base budget requirements in support of the National Defense Strategy. The Budget requests these funds in OCO to comply with the base budget defense caps included in the Budget Control Act of 2011.

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Summary Recap of Budget Activities	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted (Base+Emerg+ OCO)
Basic Research	545,223	549,761			549,761
Applied Research	1,482,434	1,656,126			1,656,126
Advanced Technology Development	876,008	1,066,453			1,066,453
Advanced Component Development & Prototypes	6,386,187	8,244,911		44,335	8,289,246
System Development & Demonstration	5,377,043	6,690,641			6,690,641
Management Support	3,769,578	2,878,071			2,878,071
Operational Systems Development	22,982,541	24,480,992		83,913	24,564,905
Software & Digital Technology Pilot Programs					
Total Research, Development, Test & Evaluation	41,419,014	45,566,955		128,248	45,695,203

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Summary Recap of Budget Activities	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)
Basic Research	492,294				492,294
Applied Research	1,540,623				1,540,623
Advanced Technology Development	778,548				778,548
Advanced Component Development & Prototypes	9,049,227				9,049,227
System Development & Demonstration	6,359,375				6,359,375
Management Support	3,149,790				3,149,790
Operational Systems Development	26,199,822		5,304	5,304	26,205,126
Software & Digital Technology Pilot Programs	149,742				149,742
Total Research, Development, Test & Evaluation	47,719,421		5,304	5,304	47,724,725



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	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted (Base+Emerg+ OCO)
Summary Recap of FYDP Programs -----					
Strategic Forces	933,653	846,784			846,784
General Purpose Forces	3,020,691	3,748,342		5,200	3,753,542
Intelligence and Communications	1,530,574	1,340,238			1,340,238
Mobility Forces	894,433	936,221			936,221
Research and Development	13,189,310	14,528,474		26,450	14,554,924
Central Supply and Maintenance	93,964	37,505			37,505
Training Medical and Other	2,488	8,542			8,542
Administration and Associated Activities	117,431	90,730			90,730
Support of Other Nations	3,866	4,071			4,071
Space	4,800,166	6,240,052		17,885	6,257,937
Classified Programs	16,832,438	17,785,996		78,713	17,864,709
Total Research, Development, Test & Evaluation	41,419,014	45,566,955		128,248	45,695,203

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	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)
Summary Recap of FYDP Programs					
Strategic Forces	1,065,581				1,065,581
General Purpose Forces	4,019,405		5,304	5,304	4,024,709
Intelligence and Communications	1,090,263				1,090,263
Mobility Forces	1,048,447				1,048,447
Research and Development	14,101,988				14,101,988
Central Supply and Maintenance	95,633				95,633
Training Medical and Other	7,073				7,073
Administration and Associated Activities	78,515				78,515
Support of Other Nations	3,599				3,599
Space	6,798,195				6,798,195
Classified Programs	19,410,722				19,410,722
Total Research, Development, Test & Evaluation	47,719,421		5,304	5,304	47,724,725

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Summary Recap of Budget Activities -----					
Basic Research	545,223	549,761			549,761
Applied Research	1,482,434	1,656,126			1,656,126
Advanced Technology Development	876,008	1,066,453			1,066,453
Advanced Component Development & Prototypes	6,386,187	8,244,911		44,335	8,289,246
System Development & Demonstration	5,377,043	6,690,641			6,690,641
Management Support	3,769,578	2,878,071			2,878,071
Operational Systems Development	22,982,541	24,480,992		83,913	24,564,905
Total Research, Development, Test & Evaluation	41,419,014	45,566,955		128,248	45,695,203
Summary Recap of FYDP Programs -----					
Strategic Forces	933,653	846,784			846,784
General Purpose Forces	3,020,691	3,748,342		5,200	3,753,542
Intelligence and Communications	1,530,574	1,340,238			1,340,238
Mobility Forces	894,433	936,221			936,221
Research and Development	13,189,310	14,528,474		26,450	14,554,924
Central Supply and Maintenance	93,964	37,505			37,505
Training Medical and Other	2,488	8,542			8,542
Administration and Associated Activities	117,431	90,730			90,730
Support of Other Nations	3,866	4,071			4,071

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-----	-----	-----	-----	-----	-----
Basic Research	492,294				492,294
Applied Research	1,409,749				1,409,749
Advanced Technology Development	778,548				778,548
Advanced Component Development & Prototypes	7,737,916				7,737,916
System Development & Demonstration	2,615,359				2,615,359
Management Support	2,891,280				2,891,280
Operational Systems Development	21,466,680		5,304	5,304	21,471,984
Total Research, Development, Test & Evaluation	37,391,826		5,304	5,304	37,397,130
Summary Recap of FYDP Programs					
-----					
Strategic Forces	1,065,581				1,065,581
General Purpose Forces	4,019,405		5,304	5,304	4,024,709
Intelligence and Communications	1,090,263				1,090,263
Mobility Forces	1,048,447				1,048,447
Research and Development	14,101,988				14,101,988
Central Supply and Maintenance	95,633				95,633
Training Medical and Other	7,073				7,073
Administration and Associated Activities	78,515				78,515
Support of Other Nations	3,599				3,599

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Summary Recap of Budget Activities	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted (Base+Emerg+ OCO)
Space	4,800,166	6,240,052		17,885	6,257,937
Classified Programs	16,832,438	17,785,996		78,713	17,864,709
Total Research, Development, Test & Evaluation	41,419,014	45,566,955		128,248	45,695,203

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Summary Recap of Budget Activities	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)
Space	103,466				103,466
Classified Programs	15,777,856				15,777,856
Total Research, Development, Test & Evaluation	37,391,826		5,304	5,304	37,397,130

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Appropriation: 3600F Research, Development, Test &amp; Eval, AF

Line No	Program Element Number	Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020	
								Total Enacted S (Base+Emerg+ e OCO)	c
1	0601102F	Defense Research Sciences	01	374,047	356,107			356,107	U
2	0601103F	University Research Initiatives	01	159,073	178,859			178,859	U
3	0601108F	High Energy Laser Research Initiatives	01	12,103	14,795			14,795	U
		Basic Research		545,223	549,761			549,761	
4	0602020F	Future AF Capabilities Applied Research	02						U
5	0602102F	Materials	02	172,109	215,851			215,851	U
6	0602201F	Aerospace Vehicle Technologies	02	150,625	157,724			157,724	U
7	0602202F	Human Effectiveness Applied Research	02	109,598	134,795			134,795	U
8	0602203F	Aerospace Propulsion	02	202,638	226,775			226,775	U
9	0602204F	Aerospace Sensors	02	168,897	219,912			219,912	U
10	0602212F	Defense Laboratories R&D Projects (10 U.S.C, Sec 2358)	02	86,165					U
11	0602298F	Science and Technology Management - Major Headquarters Activities	02	8,288	7,968			7,968	U
12	0602602F	Conventional Munitions	02	100,573	142,772			142,772	U
13	0602605F	Directed Energy Technology	02	129,579	124,379			124,379	U
14	0602788F	Dominant Information Sciences and Methods	02	182,221	216,062			216,062	U
15	0602890F	High Energy Laser Research	02	40,400	48,221			48,221	U

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Line No	Program Element Number	Item	Act	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)	Se
1	0601102F	Defense Research Sciences	01	315,348				315,348	U
2	0601103F	University Research Initiatives	01	161,861				161,861	U
3	0601108F	High Energy Laser Research Initiatives	01	15,085				15,085	U
		Basic Research		492,294				492,294	
4	0602020F	Future AF Capabilities Applied Research	02	100,000				100,000	U
5	0602102F	Materials	02	140,781				140,781	U
6	0602201F	Aerospace Vehicle Technologies	02	349,225				349,225	U
7	0602202F	Human Effectiveness Applied Research	02	115,222				115,222	U
8	0602203F	Aerospace Propulsion	02						U
9	0602204F	Aerospace Sensors	02	211,301				211,301	U
10	0602212F	Defense Laboratories R&D Projects (10 U.S.C, Sec 2358)	02						U
11	0602298F	Science and Technology Management - Major Headquarters Activities	02	8,926				8,926	U
12	0602602F	Conventional Munitions	02	132,425				132,425	U
13	0602605F	Directed Energy Technology	02	128,113				128,113	U
14	0602788F	Dominant Information Sciences and Methods	02	178,668				178,668	U
15	0602890F	High Energy Laser Research	02	45,088				45,088	U

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16	1206601F	Space Technology	02	131,341	161,667			161,667	U
		Applied Research		1,482,434	1,656,126			1,656,126	
17	0603030F	AF Foundational Development/Demos	03						U
18	0603032F	Future AF Integrated Technology Demos	03						U
19	0603033F	Next Gen Platform Dev/Demo	03						U
20	0603034F	Persistent Knowledge, Awareness, & C2 Tech	03						U
21	0603035F	Next Gen Effects Dev/Demos	03						U
22	0603112F	Advanced Materials for Weapon Systems	03	44,099	60,086			60,086	U
23	0603199F	Sustainment Science and Technology (S&T)	03	13,353	16,249			16,249	U
24	0603203F	Advanced Aerospace Sensors	03	41,462	42,292			42,292	U
25	0603211F	Aerospace Technology Dev/Demo	03	115,406	127,949			127,949	U
26	0603216F	Aerospace Propulsion and Power Technology	03	140,247	170,973			170,973	U
27	0603270F	Electronic Combat Technology	03	53,704	48,408			48,408	U
28	0603401F	Advanced Spacecraft Technology	03	65,727	80,525			80,525	U
29	0603444F	Maui Space Surveillance System (MSSS)	03	10,268	11,878			11,878	U
30	0603456F	Human Effectiveness Advanced Technology Development	03	32,624	37,542			37,542	U
31	0603601F	Conventional Weapons Technology	03	191,704	225,817			225,817	U

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16	1206601F	Space Technology	02						U
		Applied Research		1,409,749				1,409,749	
17	0603030F	AF Foundational Development/Demos	03	103,280				103,280	U
18	0603032F	Future AF Integrated Technology Demos	03	157,619				157,619	U
19	0603033F	Next Gen Platform Dev/Demo	03	199,556				199,556	U
20	0603034F	Persistent Knowledge, Awareness, & C2 Tech	03	102,276				102,276	U
21	0603035F	Next Gen Effects Dev/Demos	03	215,817				215,817	U
22	0603112F	Advanced Materials for Weapon Systems	03						U
23	0603199F	Sustainment Science and Technology (S&T)	03						U
24	0603203F	Advanced Aerospace Sensors	03						U
25	0603211F	Aerospace Technology Dev/Demo	03						U
26	0603216F	Aerospace Propulsion and Power Technology	03						U
27	0603270F	Electronic Combat Technology	03						U
28	0603401F	Advanced Spacecraft Technology	03						U
29	0603444F	Maui Space Surveillance System (MSSS)	03						U
30	0603456F	Human Effectiveness Advanced Technology Development	03						U
31	0603601F	Conventional Weapons Technology	03						U

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32	0603605F	Advanced Weapons Technology	03	39,438	37,404			37,404	U
33	0603680F	Manufacturing Technology Program	03	62,187	130,916			130,916	U
34	0603788F	Battlespace Knowledge Development and Demonstration	03	58,369	56,414			56,414	U
35	0604445F	Wide Area Surveillance	03		20,000			20,000	U
36	0303467F	SENSR Spectrum Pipeline SRF	03	7,265					U
37	0303567F	Non-SENSR Spectrum Pipeline SRF	03	155					U
		Advanced Technology Development		876,008	1,066,453			1,066,453	
38	0603260F	Intelligence Advanced Development	04	5,568	5,672			5,672	U
39	0603742F	Combat Identification Technology	04	17,561	32,085			32,085	U
40	0603790F	NATO Research and Development	04	2,221	4,955			4,955	U
41	0603851F	Intercontinental Ballistic Missile - Dem/Val	04	24,994	30,969			30,969	U
42	0603859F	Pollution Prevention - Dem/Val	04	193	3,000			3,000	U
43	0604002F	Air Force Weather Services Research	04		772			772	U
44	0604003F	Advanced Battle Management System (ABMS)	04		8,000			8,000	U
45	0604004F	Advanced Engine Development	04	696,099	671,442			671,442	U
46	0604015F	Long Range Strike - Bomber	04	2,189,945	2,982,499			2,982,499	U
47	0604032F	Directed Energy Prototyping	04	48,316	44,000			44,000	U
48	0604033F	Hypersonics Prototyping	04	494,485	576,000			576,000	U

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32	0603605F	Advanced Weapons Technology	03						U
33	0603680F	Manufacturing Technology Program	03						U
34	0603788F	Battlespace Knowledge Development and Demonstration	03						U
35	0604445F	Wide Area Surveillance	03						U
36	0303467F	SENSR Spectrum Pipeline SRF	03						U
37	0303567F	Non-SENSR Spectrum Pipeline SRF	03						U
		Advanced Technology Development		778,548				778,548	
38	0603260F	Intelligence Advanced Development	04	4,320				4,320	U
39	0603742F	Combat Identification Technology	04	26,396				26,396	U
40	0603790F	NATO Research and Development	04	3,647				3,647	U
41	0603851F	Intercontinental Ballistic Missile - Dem/Val	04	32,959				32,959	U
42	0603859F	Pollution Prevention - Dem/Val	04						U
43	0604002F	Air Force Weather Services Research	04	869				869	U
44	0604003F	Advanced Battle Management System (ABMS)	04	302,323				302,323	U
45	0604004F	Advanced Engine Development	04	636,495				636,495	U
46	0604015F	Long Range Strike - Bomber	04	2,848,410				2,848,410	U
47	0604032F	Directed Energy Prototyping	04	20,964				20,964	U
48	0604033F	Hypersonics Prototyping	04	381,862				381,862	U

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Line No	Program Element Number	Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted S (Base+Emerg+ e OCO)	c
49	0604201F	PNT Resiliency, Mods, and Improvements	04	86,445	124,600			124,600	U
50	0604257F	Advanced Technology and Sensors	04	34,585	23,145			23,145	U
51	0604288F	National Airborne Ops Center (NAOC) Recap	04	7,168	12,669			12,669	U
52	0604317F	Technology Transfer	04	18,754	37,614			37,614	U
53	0604327F	Hard and Deeply Buried Target Defeat System (HDBTDS) Program	04	41,259	113,121			113,121	U
54	0604414F	Cyber Resiliency of Weapon Systems-ACS	04	57,671	56,325			56,325	U
55	0604776F	Deployment & Distribution Enterprise R&D	04	27,301	28,034			28,034	U
56	0604858F	Tech Transition Program	04	163,132	288,476		26,450	314,926	U
57	0605230F	Ground Based Strategic Deterrent	04	401,244	557,495			557,495	U
58	0207100F	Light Attack Armed Reconnaissance (LAAR) Squadrons	04		2,000			2,000	U
59	0207110F	Next Generation Air Dominance	04	413,938	905,000			905,000	U
60	0207455F	Three Dimensional Long-Range Radar (3DELRR)	04	24,716	23,190			23,190	U
61	0207522F	Airbase Air Defense Systems (ABADS)	04						U
62	0208099F	Unified Platform (UP)	04	28,327	10,000			10,000	U
63	0305236F	Common Data Link Executive Agent (CDL EA)	04	41,880	36,910			36,910	U

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49	0604201F	PNT Resiliency, Mods, and Improvements	04						U
50	0604257F	Advanced Technology and Sensors	04	24,747				24,747	U
51	0604288F	National Airborne Ops Center (NAOC) Recap	04	76,417				76,417	U
52	0604317F	Technology Transfer	04	3,011				3,011	U
53	0604327F	Hard and Deeply Buried Target Defeat System (HDBTDS) Program	04	52,921				52,921	U
54	0604414F	Cyber Resiliency of Weapon Systems-ACS	04	69,783				69,783	U
55	0604776F	Deployment & Distribution Enterprise R&D	04	25,835				25,835	U
56	0604858F	Tech Transition Program	04	219,252				219,252	U
57	0605230F	Ground Based Strategic Deterrent	04	1,524,759				1,524,759	U
58	0207100F	Light Attack Armed Reconnaissance (LAAR) Squadrons	04						U
59	0207110F	Next Generation Air Dominance	04	1,044,089				1,044,089	U
60	0207455F	Three Dimensional Long-Range Radar (3DELRR)	04	19,356				19,356	U
61	0207522F	Airbase Air Defense Systems (ABADS)	04	8,737				8,737	U
62	0208099F	Unified Platform (UP)	04	5,990				5,990	U
63	0305236F	Common Data Link Executive Agent (CDL EA)	04	39,293				39,293	U

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64	0305251F	Cyberspace Operations Forces and Force Support	04		35,000			35,000	U
65	0305601F	Mission Partner Environments	04	9,694	8,550			8,550	U
66	0306250F	Cyber Operations Technology Development	04	237,393	202,364			202,364	U
67	0306415F	Enabled Cyber Activities	04	15,728	16,632			16,632	U
68	0401310F	C-32 Executive Transport Recapitalization	04						U
69	0901410F	Contracting Information Technology System	04	16,998	20,830			20,830	U
70	1203164F	NAVSTAR Global Positioning System (User Equipment) (SPACE)	04	236,786	320,598			320,598	U
71	1203710F	EO/IR Weather Systems	04	7,786	125,964			125,964	U
72	1206422F	Weather System Follow-on	04	128,600	205,660			205,660	U
73	1206425F	Space Situation Awareness Systems	04	32,351	29,776			29,776	U
74	1206427F	Space Systems Prototype Transitions (SSPT)	04		142,045			142,045	U
75	1206434F	Midterm Polar MILSATCOM System	04	370,353					U
76	1206438F	Space Control Technology	04	68,604	58,231			58,231	U
77	1206730F	Space Security and Defense Program	04	45,542	56,385			56,385	U
78	1206760F	Protected Tactical Enterprise Service (PTES)	04	45,009	105,003			105,003	U
79	1206761F	Protected Tactical Service (PTS)	04	28,754	163,694			163,694	U
80	1206855F	Evolved Strategic SATCOM (ESS)	04	28,498	167,206			167,206	U

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64	0305251F	Cyberspace Operations Forces and Force Support	04						U
65	0305601F	Mission Partner Environments	04	11,430				11,430	U
66	0306250F	Cyber Operations Technology Development	04	259,823				259,823	U
67	0306415F	Enabled Cyber Activities	04	10,560				10,560	U
68	0401310F	C-32 Executive Transport Recapitalization	04	9,908				9,908	U
69	0901410F	Contracting Information Technology System	04	8,662				8,662	U
70	1203164F	NAVSTAR Global Positioning System (User Equipment) (SPACE)	04						U
71	1203710F	EO/IR Weather Systems	04						U
72	1206422F	Weather System Follow-on	04						U
73	1206425F	Space Situation Awareness Systems	04						U
74	1206427F	Space Systems Prototype Transitions (SSPT)	04	8,787				8,787	U
75	1206434F	Midterm Polar MILSATCOM System	04						U
76	1206438F	Space Control Technology	04						U
77	1206730F	Space Security and Defense Program	04	56,311				56,311	U
78	1206760F	Protected Tactical Enterprise Service (PTES)	04						U
79	1206761F	Protected Tactical Service (PTS)	04						U
80	1206855F	Evolved Strategic SATCOM (ESS)	04						U

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81	1206857F	Space Rapid Capabilities Office	04	288,289	9,000		17,885	26,885	U
		Advanced Component Development & Prototypes		6,386,187	8,244,911		44,335	8,289,246	
82	0604200F	Future Advanced Weapon Analysis & Programs	05	262	5,000			5,000	U
83	0604201F	PNT Resiliency, Mods, and Improvements	05	45,363	142,782			142,782	U
84	0604222F	Nuclear Weapons Support	05	4,311	4,406			4,406	U
85	0604270F	Electronic Warfare Development	05	1,839	2,066			2,066	U
86	0604281F	Tactical Data Networks Enterprise	05	242,328	189,631			189,631	U
87	0604287F	Physical Security Equipment	05	13,893	9,700			9,700	U
88	0604329F	Small Diameter Bomb (SDB) - EMD	05	75,345	45,241			45,241	U
89	0604429F	Airborne Electronic Attack	05	5,948					U
90	0604602F	Armament/Ordnance Development	05	44,788	28,043			28,043	U
91	0604604F	Submunitions	05	2,989	3,045			3,045	U
92	0604617F	Agile Combat Support	05	22,739	26,944			26,944	U
93	0604618F	Joint Direct Attack Munition	05						U
94	0604706F	Life Support Systems	05	10,334	14,624			14,624	U
95	0604735F	Combat Training Ranges	05	42,383	52,365			52,365	U
96	0604800F	F-35 - EMD	05	67,999	7,628			7,628	U
97	0604932F	Long Range Standoff Weapon	05	646,800	712,539			712,539	U
98	0604933F	ICBM Fuze Modernization	05	124,457	161,199			161,199	U

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81	1206857F	Space Rapid Capabilities Office	04						U
		Advanced Component Development & Prototypes		7,737,916				7,737,916	
82	0604200F	Future Advanced Weapon Analysis & Programs	05	25,161				25,161	U
83	0604201F	PNT Resiliency, Mods, and Improvements	05	38,564				38,564	U
84	0604222F	Nuclear Weapons Support	05	35,033				35,033	U
85	0604270F	Electronic Warfare Development	05	2,098				2,098	U
86	0604281F	Tactical Data Networks Enterprise	05	131,909				131,909	U
87	0604287F	Physical Security Equipment	05	6,752				6,752	U
88	0604329F	Small Diameter Bomb (SDB) - EMD	05	17,280				17,280	U
89	0604429F	Airborne Electronic Attack	05						U
90	0604602F	Armament/Ordnance Development	05	23,076				23,076	U
91	0604604F	Submunitions	05	3,091				3,091	U
92	0604617F	Agile Combat Support	05	20,609				20,609	U
93	0604618F	Joint Direct Attack Munition	05	7,926				7,926	U
94	0604706F	Life Support Systems	05	23,660				23,660	U
95	0604735F	Combat Training Ranges	05	8,898				8,898	U
96	0604800F	F-35 - EMD	05	5,423				5,423	U
97	0604932F	Long Range Standoff Weapon	05	474,430				474,430	U
98	0604933F	ICBM Fuze Modernization	05	167,099				167,099	U

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99	0605030F	Joint Tactical Network Center (JTNC)	05		2,414			2,414	U
100	0605056F	Open Architecture Management	05		30,000			30,000	U
101	0605221F	KC-46	05	77,852	59,561			59,561	U
102	0605223F	Advanced Pilot Training	05	236,840	340,373			340,373	U
103	0605229F	Combat Rescue Helicopter	05	430,483	247,047			247,047	U
104	0605931F	B-2 Defensive Management System	05	244,638	250,100			250,100	U
105	0101125F	Nuclear Weapons Modernization	05	42,001	27,564			27,564	U
106	0207171F	F-15 EPAWSS	05	133,382	47,322			47,322	U
107	0207328F	Stand In Attack Weapon	05	14,542	162,840			162,840	U
108	0207701F	Full Combat Mission Training	05	978	9,797			9,797	U
109	0303267F	Auctioned Spectrum Relocation Fund	05	44,652					U
110	0305176F	Combat Survivor Evader Locator	05						U
111	0401221F	KC-46A Tanker Squadrons	05						U
112	0401310F	C-32 Executive Transport Recapitalization	05	5,989	9,930			9,930	U
113	0401319F	VC-25B	05	713,633	757,923			757,923	U
114	0701212F	Automated Test Systems	05	13,153	2,787			2,787	U
115	0804772F	Training Developments	05						U
116	0901299F	AF A1 Systems	05						U
117	1203176F	Combat Survivor Evader Locator	05	913	2,000			2,000	U

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99	0605030F	Joint Tactical Network Center (JTNC)	05						U
100	0605056F	Open Architecture Management	05	30,547				30,547	U
101	0605221F	KC-46	05						U
102	0605223F	Advanced Pilot Training	05	248,669				248,669	U
103	0605229F	Combat Rescue Helicopter	05	63,169				63,169	U
104	0605931F	B-2 Defensive Management System	05						U
105	0101125F	Nuclear Weapons Modernization	05	9,683				9,683	U
106	0207171F	F-15 EPAWSS	05	170,679				170,679	U
107	0207328F	Stand In Attack Weapon	05	160,438				160,438	U
108	0207701F	Full Combat Mission Training	05	9,422				9,422	U
109	0303267F	Auctioned Spectrum Relocation Fund	05						U
110	0305176F	Combat Survivor Evader Locator	05	973				973	U
111	0401221F	KC-46A Tanker Squadrons	05	106,262				106,262	U
112	0401310F	C-32 Executive Transport Recapitalization	05						U
113	0401319F	VC-25B	05	800,889				800,889	U
114	0701212F	Automated Test Systems	05	10,673				10,673	U
115	0804772F	Training Developments	05	4,479				4,479	U
116	0901299F	AF A1 Systems	05	8,467				8,467	U
117	1203176F	Combat Survivor Evader Locator	05						U

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118	1203269F	GPS III Follow-On (GPS IIIIF)	05	412,202	447,875			447,875	U
119	1203940F	Space Situation Awareness Operations	05	35,569	56,829			56,829	U
120	1206421F	Counterspace Systems	05	19,637	27,037			27,037	U
121	1206422F	Weather System Follow-on	05		2,237			2,237	U
122	1206425F	Space Situation Awareness Systems	05	139,172	362,894			362,894	U
123	1206426F	Space Fence	05	18,841					U
124	1206431F	Advanced EHF MILSATCOM (SPACE)	05	139,927	117,290			117,290	U
125	1206432F	Polar MILSATCOM (SPACE)	05	25,480	412,400			412,400	U
126	1206433F	Wideband Global SATCOM (SPACE)	05	3,833	1,920			1,920	U
127	1206441F	Space Based Infrared System (SBIRS) High EMD	05	58,765	1			1	U
128	1206442F	Next Generation OPIR	05	736,389	1,470,278			1,470,278	U
129	1206445F	Commercial SATCOM (COMSATCOM) Integration	05	47,869	5,000			5,000	U
130	1206853F	National Security Space Launch Program (SPACE) - EMD	05	428,525	432,009			432,009	U
		System Development & Demonstration		5,377,043	6,690,641			6,690,641	
131	0604256F	Threat Simulator Development	06	33,666	59,693			59,693	U
132	0604759F	Major T&E Investment	06	213,273	106,663			106,663	U
133	0605101F	RAND Project Air Force	06	33,308	35,258			35,258	U
134	0605502F	Small Business Innovation Research	06	795,378					U

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118	1203269F	GPS III Follow-On (GPS IIIIF)	05						U
119	1203940F	Space Situation Awareness Operations	05						U
120	1206421F	Counterspace Systems	05						U
121	1206422F	Weather System Follow-on	05						U
122	1206425F	Space Situation Awareness Systems	05						U
123	1206426F	Space Fence	05						U
124	1206431F	Advanced EHF MILSATCOM (SPACE)	05						U
125	1206432F	Polar MILSATCOM (SPACE)	05						U
126	1206433F	Wideband Global SATCOM (SPACE)	05						U
127	1206441F	Space Based Infrared System (SBIRS) High EMD	05						U
128	1206442F	Next Generation OPIR	05						U
129	1206445F	Commercial SATCOM (COMSATCOM) Integration	05						U
130	1206853F	National Security Space Launch Program (SPACE) - EMD	05						U
		System Development & Demonstration		2,615,359				2,615,359	
131	0604256F	Threat Simulator Development	06	57,725				57,725	U
132	0604759F	Major T&E Investment	06	208,680				208,680	U
133	0605101F	RAND Project Air Force	06	35,803				35,803	U
134	0605502F	Small Business Innovation Research	06						U

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135	0605712F	Initial Operational Test & Evaluation	06	17,383	13,793			13,793	U
136	0605807F	Test and Evaluation Support	06	692,784	717,895			717,895	U
137	0605826F	Acq Workforce- Global Power	06	229,904	255,667			255,667	U
138	0605827F	Acq Workforce- Global Vig & Combat Sys	06	243,647	249,992			249,992	U
139	0605828F	Acq Workforce- Global Reach	06	149,306	149,191			149,191	U
140	0605829F	Acq Workforce- Cyber, Network, & Bus Sys	06	227,337	235,360			235,360	U
141	0605830F	Acq Workforce- Global Battle Mgmt	06	157,258	160,196			160,196	U
142	0605831F	Acq Workforce- Capability Integration	06	237,297	228,255			228,255	U
143	0605832F	Acq Workforce- Advanced Prgm Technology	06	36,739	39,392			39,392	U
144	0605833F	Acq Workforce- Nuclear Systems	06	126,681	133,231			133,231	U
145	0605898F	Management HQ - R&D	06	11,024	5,590			5,590	U
146	0605976F	Facilities Restoration and Modernization - Test and Evaluation Support	06	187,216	88,445			88,445	U
147	0605978F	Facilities Sustainment - Test and Evaluation Support	06	28,888	29,424			29,424	U
148	0606017F	Requirements Analysis and Maturation	06	46,145	86,715			86,715	U
149	0606398F	Management HQ - T&E	06		5,013			5,013	U

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135	0605712F	Initial Operational Test & Evaluation	06	13,557				13,557	U
136	0605807F	Test and Evaluation Support	06	764,606				764,606	U
137	0605826F	Acq Workforce- Global Power	06						U
138	0605827F	Acq Workforce- Global Vig & Combat Sys	06						U
139	0605828F	Acq Workforce- Global Reach	06						U
140	0605829F	Acq Workforce- Cyber, Network, & Bus Sys	06						U
141	0605830F	Acq Workforce- Global Battle Mgmt	06						U
142	0605831F	Acq Workforce- Capability Integration	06	1,362,038				1,362,038	U
143	0605832F	Acq Workforce- Advanced Prgm Technology	06	40,768				40,768	U
144	0605833F	Acq Workforce- Nuclear Systems	06	179,646				179,646	U
145	0605898F	Management HQ - R&D	06	5,734				5,734	U
146	0605976F	Facilities Restoration and Modernization - Test and Evaluation Support	06	70,985				70,985	U
147	0605978F	Facilities Sustainment - Test and Evaluation Support	06	29,880				29,880	U
148	0606017F	Requirements Analysis and Maturation	06	63,381				63,381	U
149	0606398F	Management HQ - T&E	06	5,785				5,785	U

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150	0303255F	Command, Control, Communication, and Computers (C4) - STRATCOM	06						U
151	0308602F	ENTEPRISE INFORMATION SERVICES (EIS)	06	17,258	10,628			10,628	U
152	0702806F	Acquisition and Management Support	06	12,130	5,913			5,913	U
153	0804731F	General Skill Training	06	432	6,475			6,475	U
154	0909999F	Financing for Cancelled Account Adjustments	06	3,593					U
155	1001004F	International Activities	06	3,866	4,071			4,071	U
156	1206116F	Space Test and Training Range Development	06	22,408	14,942			14,942	U
157	1206392F	ACQ Workforce - Space & Missile Systems	06	180,512	167,810			167,810	U
158	1206398F	Space & Missile Systems Center - MHA	06	10,508	10,170			10,170	U
159	1206860F	Rocket Systems Launch Program (SPACE)	06	21,906	13,192			13,192	U
160	1206862F	Tactically Responsive Launch	06		19,000			19,000	U
161	1206864F	Space Test Program (STP)	06	29,731	26,097			26,097	U
		Management Support		3,769,578	2,878,071			2,878,071	
162	0604003F	Advanced Battle Management System (ABMS)	07	27,883	35,611			35,611	U
163	0604233F	Specialized Undergraduate Flight Training	07	10,974	2,584			2,584	U

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150	0303255F	Command, Control, Communication, and Computers (C4) - STRATCOM	06	24,564				24,564	U
151	0308602F	ENTEPRISE INFORMATION SERVICES (EIS)	06	9,883				9,883	U
152	0702806F	Acquisition and Management Support	06	13,384				13,384	U
153	0804731F	General Skill Training	06	1,262				1,262	U
154	0909999F	Financing for Cancelled Account Adjustments	06						U
155	1001004F	International Activities	06	3,599				3,599	U
156	1206116F	Space Test and Training Range Development	06						U
157	1206392F	ACQ Workforce - Space & Missile Systems	06						U
158	1206398F	Space & Missile Systems Center - MHA	06						U
159	1206860F	Rocket Systems Launch Program (SPACE)	06						U
160	1206862F	Tactically Responsive Launch	06						U
161	1206864F	Space Test Program (STP)	06						U
		Management Support		2,891,280				2,891,280	
162	0604003F	Advanced Battle Management System (ABMS)	07						U
163	0604233F	Specialized Undergraduate Flight Training	07	8,777				8,777	U

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164	0604776F	Deployment & Distribution Enterprise R&D	07	257	903			903	U
165	0604840F	F-35 C2D2	07		642,371			642,371	U
166	0605018F	AF Integrated Personnel and Pay System (AF-IPPS)	07	39,794	40,567			40,567	U
167	0605024F	Anti-Tamper Technology Executive Agency	07	32,182	47,193			47,193	U
168	0605117F	Foreign Materiel Acquisition and Exploitation	07	68,368	70,083			70,083	U
169	0605278F	HC/MC-130 Recap RDT&E	07	15,641	17,218			17,218	U
170	0606018F	NC3 Integration	07	18,633	25,917			25,917	U
171	0606942F	Assessments and Evaluations Cyber Vulnerabilities	07	84,908					U
172	0101113F	B-52 Squadrons	07	290,097	323,624			323,624	U
173	0101122F	Air-Launched Cruise Missile (ALCM)	07	5,741	10,217			10,217	U
174	0101126F	B-1B Squadrons	07	58,175	1,000			1,000	U
175	0101127F	B-2 Squadrons	07	101,827	93,076			93,076	U
176	0101213F	Minuteman Squadrons	07	185,640	104,219			104,219	U
177	0101316F	Worldwide Joint Strategic Communications	07	17,767	26,177			26,177	U
178	0101324F	Integrated Strategic Planning & Analysis Network	07	22,231	24,261			24,261	U
179	0101328F	ICBM Reentry Vehicles	07	13,747	65,671			65,671	U
181	0102110F	UH-1N Replacement Program	07	190,523	170,975			170,975	U

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164	0604776F	Deployment & Distribution Enterprise R&D	07	499				499	U
165	0604840F	F-35 C2D2	07	785,336				785,336	U
166	0605018F	AF Integrated Personnel and Pay System (AF-IPPS)	07	27,035				27,035	U
167	0605024F	Anti-Tamper Technology Executive Agency	07	50,508				50,508	U
168	0605117F	Foreign Materiel Acquisition and Exploitation	07	71,229				71,229	U
169	0605278F	HC/MC-130 Recap RDT&E	07	24,705				24,705	U
170	0606018F	NC3 Integration	07	26,356				26,356	U
171	0606942F	Assessments and Evaluations Cyber Vulnerabilities	07						U
172	0101113F	B-52 Squadrons	07	520,023				520,023	U
173	0101122F	Air-Launched Cruise Missile (ALCM)	07	1,433				1,433	U
174	0101126F	B-1B Squadrons	07	15,766				15,766	U
175	0101127F	B-2 Squadrons	07	187,399				187,399	U
176	0101213F	Minuteman Squadrons	07	116,569				116,569	U
177	0101316F	Worldwide Joint Strategic Communications	07	27,235				27,235	U
178	0101324F	Integrated Strategic Planning & Analysis Network	07	24,227				24,227	U
179	0101328F	ICBM Reentry Vehicles	07	112,753				112,753	U
181	0102110F	UH-1N Replacement Program	07	44,464				44,464	U

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								Total Enacted S (Base+Emerg+ e OCO)	c
182	0102326F	Region/Sector Operation Control Center Modernization Program	07	5,904					U
183	0102412F	North Warning System (NWS)	07						U
184	0205219F	MQ-9 UAV	07	105,088	127,296			127,296	U
185	0205671F	Joint Counter RCIED Electronic Warfare	07	4,000			4,000	4,000	U
186	0207131F	A-10 Squadrons	07	27,537	31,916			31,916	U
187	0207133F	F-16 Squadrons	07	182,190	193,013			193,013	U
188	0207134F	F-15E Squadrons	07	196,035	684,229			684,229	U
189	0207136F	Manned Destructive Suppression	07	13,609	15,521			15,521	U
190	0207138F	F-22A Squadrons	07	563,635	546,298			546,298	U
191	0207142F	F-35 Squadrons	07	490,319	99,943			99,943	U
192	0207146F	F-15EX	07						U
193	0207161F	Tactical AIM Missiles	07	29,042	10,314			10,314	U
194	0207163F	Advanced Medium Range Air-to-Air Missile (AMRAAM)	07	50,728	55,384			55,384	U
195	0207227F	Combat Rescue - Pararescue	07	623	281			281	U
196	0207247F	AF TENCAP	07		21,365			21,365	U
197	0207249F	Precision Attack Systems Procurement	07	14,346	10,696			10,696	U
198	0207253F	Compass Call	07	43,466	31,888			31,888	U
199	0207268F	Aircraft Engine Component Improvement Program	07	116,808	112,505			112,505	U

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182	0102326F	Region/Sector Operation Control Center Modernization Program	07	5,929				5,929	U
183	0102412F	North Warning System (NWS)	07	100				100	U
184	0205219F	MQ-9 UAV	07	162,080				162,080	U
185	0205671F	Joint Counter RCIED Electronic Warfare	07			4,080	4,080	4,080	U
186	0207131F	A-10 Squadrons	07	24,535				24,535	U
187	0207133F	F-16 Squadrons	07	223,437				223,437	U
188	0207134F	F-15E Squadrons	07	298,908				298,908	U
189	0207136F	Manned Destructive Suppression	07	14,960				14,960	U
190	0207138F	F-22A Squadrons	07	665,038				665,038	U
191	0207142F	F-35 Squadrons	07	132,229				132,229	U
192	0207146F	F-15EX	07	159,761				159,761	U
193	0207161F	Tactical AIM Missiles	07	19,417				19,417	U
194	0207163F	Advanced Medium Range Air-to-Air Missile (AMRAAM)	07	51,799				51,799	U
195	0207227F	Combat Rescue - Pararescue	07	669				669	U
196	0207247F	AF TENCAP	07	21,644				21,644	U
197	0207249F	Precision Attack Systems Procurement	07	9,261				9,261	U
198	0207253F	Compass Call	07	15,854				15,854	U
199	0207268F	Aircraft Engine Component Improvement Program	07	95,896				95,896	U

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200	0207325F	Joint Air-to-Surface Standoff Missile (JASSM)	07	40,933	78,498			78,498	U
201	0207410F	Air & Space Operations Center (AOC)	07	98,854	114,864			114,864	U
202	0207412F	Control and Reporting Center (CRC)	07	6,216	8,109			8,109	U
203	0207417F	Airborne Warning and Control System (AWACS)	07	108,795	67,996			67,996	U
204	0207418F	AFSPECWAR - TACP	07	2,562	2,462			2,462	U
206	0207431F	Combat Air Intelligence System Activities	07	10,316	13,668			13,668	U
207	0207438F	Theater Battle Management (TBM) C4I	07						U
208	0207444F	Tactical Air Control Party-Mod	07	6,135	4,117			4,117	U
209	0207448F	C2ISR Tactical Data Link	07	538					U
210	0207452F	DCAPES	07	14,649	19,910			19,910	U
211	0207521F	Air Force Calibration Programs	07						U
212	0207573F	National Technical Nuclear Forensics	07	1,723	1,788			1,788	U
213	0207590F	Seek Eagle	07	24,618	28,237			28,237	U
214	0207601F	USAF Modeling and Simulation	07	16,572	15,725			15,725	U
215	0207605F	Wargaming and Simulation Centers	07	5,916	4,316			4,316	U
216	0207610F	Battlefield Abn Comm Node (BACN)	07	42,349	26,946			26,946	U
217	0207697F	Distributed Training and Exercises	07	3,699	4,303			4,303	U

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200	0207325F	Joint Air-to-Surface Standoff Missile (JASSM)	07	70,792				70,792	U
201	0207410F	Air & Space Operations Center (AOC)	07	51,187				51,187	U
202	0207412F	Control and Reporting Center (CRC)	07	16,041				16,041	U
203	0207417F	Airborne Warning and Control System (AWACS)	07	138,303				138,303	U
204	0207418F	AFSPECWAR - TACP	07	4,223				4,223	U
206	0207431F	Combat Air Intelligence System Activities	07	16,564				16,564	U
207	0207438F	Theater Battle Management (TBM) C4I	07	7,858				7,858	U
208	0207444F	Tactical Air Control Party-Mod	07	12,906				12,906	U
209	0207448F	C2ISR Tactical Data Link	07						U
210	0207452F	DCAPES	07	14,816				14,816	U
211	0207521F	Air Force Calibration Programs	07	1,970				1,970	U
212	0207573F	National Technical Nuclear Forensics	07	396				396	U
213	0207590F	Seek Eagle	07	29,680				29,680	U
214	0207601F	USAF Modeling and Simulation	07	17,666				17,666	U
215	0207605F	Wargaming and Simulation Centers	07	6,353				6,353	U
216	0207610F	Battlefield Abn Comm Node (BACN)	07	6,827				6,827	U
217	0207697F	Distributed Training and Exercises	07	3,390				3,390	U

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								Total	Enacted S (Base+Emerg+ e OCO) c
218	0208006F	Mission Planning Systems	07	61,164	71,465			71,465	U
219	0208007F	Tactical Deception	07	6,687	7,446			7,446	U
220	0208064F	OPERATIONAL HQ - CYBER	07		7,602			7,602	U
221	0208087F	Distributed Cyber Warfare Operations	07	38,857	35,178			35,178	U
222	0208088F	AF Defensive Cyberspace Operations	07	36,953	38,609			38,609	U
223	0208097F	Joint Cyber Command and Control (JCC2)	07	12,553	11,603			11,603	U
224	0208099F	Unified Platform (UP)	07	26,093	84,702			84,702	U
228	0208288F	Intel Data Applications	07	1,200			1,200	1,200	U
229	0301017F	Global Sensor Integrated on Network (GSIN)	07	3,468					U
230	0301025F	GeoBase	07		2,723			2,723	U
231	0301112F	Nuclear Planning and Execution System (NPES)	07	28,623	44,190			44,190	U
238	0301401F	Air Force Space and Cyber Non-Traditional ISR for Battlespace Awareness	07	6,633	3,575			3,575	U
239	0302015F	E-4B National Airborne Operations Center (NAOC)	07	55,707	60,173			60,173	U
240	0303131F	Minimum Essential Emergency Communications Network (MEECN)	07	62,146	13,543			13,543	U
241	0303133F	High Frequency Radio Systems	07	49,912	15,881			15,881	U
242	0303140F	Information Systems Security Program	07	35,775	27,726			27,726	U

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218	0208006F	Mission Planning Systems	07	91,768				91,768	U
219	0208007F	Tactical Deception	07	2,370				2,370	U
220	0208064F	OPERATIONAL HQ - CYBER	07	5,527				5,527	U
221	0208087F	Distributed Cyber Warfare Operations	07	68,279				68,279	U
222	0208088F	AF Defensive Cyberspace Operations	07	15,165				15,165	U
223	0208097F	Joint Cyber Command and Control (JCC2)	07	38,480				38,480	U
224	0208099F	Unified Platform (UP)	07	84,645				84,645	U
228	0208288F	Intel Data Applications	07			1,224	1,224	1,224	U
229	0301017F	Global Sensor Integrated on Network (GSIN)	07						U
230	0301025F	GeoBase	07	2,767				2,767	U
231	0301112F	Nuclear Planning and Execution System (NPES)	07	32,759				32,759	U
238	0301401F	Air Force Space and Cyber Non-Traditional ISR for Battlespace Awareness	07	2,904				2,904	U
239	0302015F	E-4B National Airborne Operations Center (NAOC)	07	3,468				3,468	U
240	0303131F	Minimum Essential Emergency Communications Network (MEECN)	07	61,887				61,887	U
241	0303133F	High Frequency Radio Systems	07						U
242	0303140F	Information Systems Security Program	07	10,351				10,351	U

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243	0303142F	Global Force Management - Data Initiative	07	2,108	2,210			2,210	U
245	0304115F	Multi Domain Command and Control (MDC2)	07		100,880			100,880	U
246	0304260F	Airborne SIGINT Enterprise	07	109,838	85,157			85,157	U
247	0304310F	Commercial Economic Analysis	07	4,014	3,431			3,431	U
250	0305015F	C2 Air Operations Suite - C2 Info Services	07	8,324	9,313			9,313	U
251	0305020F	CCMD Intelligence Information Technology	07	1,586	1,121			1,121	U
252	0305022F	ISR Modernization & Automation Dvmt (IMAD)	07		19,000			19,000	U
253	0305099F	Global Air Traffic Management (GATM)	07	3,966	4,544			4,544	U
254	0305103F	Cyber Security Initiative	07						U
255	0305111F	Weather Service	07	33,563	35,461			35,461	U
256	0305114F	Air Traffic Control, Approach, and Landing System (ATCALs)	07	12,873	8,651			8,651	U
257	0305116F	Aerial Targets	07	6,527	7,448			7,448	U
260	0305128F	Security and Investigative Activities	07	403	425			425	U
261	0305145F	Arms Control Implementation	07	24,804	41,546			41,546	U
262	0305146F	Defense Joint Counterintelligence Activities	07	3,845	6,858			6,858	U
264	0305179F	Integrated Broadcast Service (IBS)	07		8,728			8,728	U

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243	0303142F	Global Force Management - Data Initiative	07	1,346				1,346	U
245	0304115F	Multi Domain Command and Control (MDC2)	07						U
246	0304260F	Airborne SIGINT Enterprise	07	128,110				128,110	U
247	0304310F	Commercial Economic Analysis	07	4,042				4,042	U
250	0305015F	C2 Air Operations Suite - C2 Info Services	07						U
251	0305020F	CCMD Intelligence Information Technology	07	1,649				1,649	U
252	0305022F	ISR Modernization & Automation Dvmt (IMAD)	07	19,265				19,265	U
253	0305099F	Global Air Traffic Management (GATM)	07	4,645				4,645	U
254	0305103F	Cyber Security Initiative	07	384				384	U
255	0305111F	Weather Service	07	23,640				23,640	U
256	0305114F	Air Traffic Control, Approach, and Landing System (ATCALs)	07	6,553				6,553	U
257	0305116F	Aerial Targets	07	449				449	U
260	0305128F	Security and Investigative Activities	07	432				432	U
261	0305145F	Arms Control Implementation	07						U
262	0305146F	Defense Joint Counterintelligence Activities	07	4,890				4,890	U
264	0305179F	Integrated Broadcast Service (IBS)	07	8,864				8,864	U

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265	0305202F	Dragon U-2	07	87,618	36,389			36,389	U
266	0305205F	Endurance Unmanned Aerial Vehicles	07	15,000	15,000			15,000	U
267	0305206F	Airborne Reconnaissance Systems	07	195,323	137,909			137,909	U
268	0305207F	Manned Reconnaissance Systems	07	14,223	11,787			11,787	U
269	0305208F	Distributed Common Ground/Surface Systems	07	52,421	25,009			25,009	U
270	0305220F	RQ-4 UAV	07	221,675	191,733			191,733	U
271	0305221F	Network-Centric Collaborative Targeting	07	14,256	10,757			10,757	U
272	0305238F	NATO AGS	07	51,527	32,567			32,567	U
273	0305240F	Support to DCGS Enterprise	07	26,579	37,774			37,774	U
274	0305600F	International Intelligence Technology and Architectures	07	11,564	13,515			13,515	U
275	0305881F	Rapid Cyber Acquisition	07	4,146	4,383			4,383	U
276	0305984F	Personnel Recovery Command & Ctrl (PRC2)	07	2,385	2,133			2,133	U
277	0307577F	Intelligence Mission Data (IMD)	07	5,717	8,614			8,614	U
278	0401115F	C-130 Airlift Squadron	07	58,408	101,425			101,425	U
279	0401119F	C-5 Airlift Squadrons (IF)	07	28,245	10,223			10,223	U
280	0401130F	C-17 Aircraft (IF)	07	43,288	21,101			21,101	U
281	0401132F	C-130J Program	07	9,924	8,640			8,640	U
282	0401134F	Large Aircraft IR Countermeasures (LAIRCM)	07	4,182	5,424			5,424	U

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265	0305202F	Dragon U-2	07	18,660				18,660	U
266	0305205F	Endurance Unmanned Aerial Vehicles	07						U
267	0305206F	Airborne Reconnaissance Systems	07	121,512				121,512	U
268	0305207F	Manned Reconnaissance Systems	07	14,711				14,711	U
269	0305208F	Distributed Common Ground/Surface Systems	07	14,152				14,152	U
270	0305220F	RQ-4 UAV	07	134,589				134,589	U
271	0305221F	Network-Centric Collaborative Targeting	07	15,049				15,049	U
272	0305238F	NATO AGS	07	36,731				36,731	U
273	0305240F	Support to DCGS Enterprise	07	33,547				33,547	U
274	0305600F	International Intelligence Technology and Architectures	07	13,635				13,635	U
275	0305881F	Rapid Cyber Acquisition	07	4,262				4,262	U
276	0305984F	Personnel Recovery Command & Ctrl (PRC2)	07	2,207				2,207	U
277	0307577F	Intelligence Mission Data (IMD)	07	6,277				6,277	U
278	0401115F	C-130 Airlift Squadron	07	41,973				41,973	U
279	0401119F	C-5 Airlift Squadrons (IF)	07	32,560				32,560	U
280	0401130F	C-17 Aircraft (IF)	07	9,991				9,991	U
281	0401132F	C-130J Program	07	10,674				10,674	U
282	0401134F	Large Aircraft IR Countermeasures (LAIRCM)	07	5,507				5,507	U

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283	0401218F	KC-135s	07	2,692					U
284	0401219F	KC-10s	07	5,084	20			20	U
285	0401314F	Operational Support Airlift	07	3,059					U
286	0401318F	CV-22	07	15,981	17,906			17,906	U
287	0401840F	AMC Command and Control System	07	1,626					U
288	0408011F	Special Tactics / Combat Control	07	2,322	3,629			3,629	U
289	0702207F	Depot Maintenance (Non-IF)	07	1,880	1,890			1,890	U
290	0708055F	Maintenance, Repair & Overhaul System	07	49,330	10,311			10,311	U
291	0708610F	Logistics Information Technology (LOGIT)	07	13,065	16,065			16,065	U
292	0708611F	Support Systems Development	07	4,406	539			539	U
293	0804743F	Other Flight Training	07	1,948	2,057			2,057	U
294	0808716F	Other Personnel Activities	07	108	10			10	U
295	0901202F	Joint Personnel Recovery Agency	07	1,947	2,060			2,060	U
296	0901218F	Civilian Compensation Program	07	2,849	3,809			3,809	U
297	0901220F	Personnel Administration	07	4,102	6,476			6,476	U
298	0901226F	Air Force Studies and Analysis Agency	07	1,364	1,443			1,443	U
299	0901538F	Financial Management Information Systems Development	07	86,578	9,323			9,323	U
300	0901554F	Defense Enterprise Acntng and Mgt Sys (DEAMS)	07		46,789			46,789	U

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283	0401218F	KC-135s	07	4,591				4,591	U
284	0401219F	KC-10s	07						U
285	0401314F	Operational Support Airlift	07						U
286	0401318F	CV-22	07	18,419				18,419	U
287	0401840F	AMC Command and Control System	07						U
288	0408011F	Special Tactics / Combat Control	07	7,673				7,673	U
289	0702207F	Depot Maintenance (Non-IF)	07						U
290	0708055F	Maintenance, Repair & Overhaul System	07	24,513				24,513	U
291	0708610F	Logistics Information Technology (LOGIT)	07	35,225				35,225	U
292	0708611F	Support Systems Development	07	11,838				11,838	U
293	0804743F	Other Flight Training	07	1,332				1,332	U
294	0808716F	Other Personnel Activities	07						U
295	0901202F	Joint Personnel Recovery Agency	07	2,092				2,092	U
296	0901218F	Civilian Compensation Program	07	3,869				3,869	U
297	0901220F	Personnel Administration	07	1,584				1,584	U
298	0901226F	Air Force Studies and Analysis Agency	07	1,197				1,197	U
299	0901538F	Financial Management Information Systems Development	07	7,006				7,006	U
300	0901554F	Defense Enterprise Acntng and Mgt Sys (DEAMS)	07	45,638				45,638	U

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301	1201017F	Global Sensor Integrated on Network (GSIN)	07		3,647			3,647	U
302	1201921F	Service Support to STRATCOM - Space Activities	07	28,636	988			988	U
303	1202140F	Service Support to SPACECOM Activities	07		11,863			11,863	U
304	1202247F	AF TENCAP	07	31,986					U
305	1203001F	Family of Advanced BLoS Terminals (FAB-T)	07	58,582	195,288			195,288	U
306	1203110F	Satellite Control Network (SPACE)	07	26,374	57,891			57,891	U
308	1203165F	NAVSTAR Global Positioning System (Space and Control Segments)	07	8,610					U
309	1203173F	Space and Missile Test and Evaluation Center	07	69,785	4,566			4,566	U
310	1203174F	Space Innovation, Integration and Rapid Technology Development	07	20,250	33,292			33,292	U
311	1203179F	Integrated Broadcast Service (IBS)	07	9,887					U
312	1203182F	Spacelift Range System (SPACE)	07	20,168	5,837			5,837	U
313	1203265F	GPS III Space Segment	07	136,998	42,440			42,440	U
314	1203400F	Space Superiority Intelligence	07	16,278	14,428			14,428	U
315	1203614F	JSpOC Mission System	07	43,108	85,762			85,762	U
316	1203620F	National Space Defense Center	07	53,305	2,653			2,653	U
317	1203873F	Ballistic Missile Defense Radars	07		15,881			15,881	U
318	1203906F	NCMC - TW/AA System	07						U

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301	1201017F	Global Sensor Integrated on Network (GSIN)	07	1,889				1,889	U
302	1201921F	Service Support to STRATCOM - Space Activities	07	993				993	U
303	1202140F	Service Support to SPACECOM Activities	07	8,999				8,999	U
304	1202247F	AF TENCAP	07						U
305	1203001F	Family of Advanced BLoS Terminals (FAB-T)	07						U
306	1203110F	Satellite Control Network (SPACE)	07						U
308	1203165F	NAVSTAR Global Positioning System (Space and Control Segments)	07						U
309	1203173F	Space and Missile Test and Evaluation Center	07						U
310	1203174F	Space Innovation, Integration and Rapid Technology Development	07						U
311	1203179F	Integrated Broadcast Service (IBS)	07						U
312	1203182F	Spacelift Range System (SPACE)	07						U
313	1203265F	GPS III Space Segment	07						U
314	1203400F	Space Superiority Intelligence	07	16,810				16,810	U
315	1203614F	JSpOC Mission System	07						U
316	1203620F	National Space Defense Center	07	2,687				2,687	U
317	1203873F	Ballistic Missile Defense Radars	07						U
318	1203906F	NCCM - TW/AA System	07	6,990				6,990	U

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319	1203913F	NUDET Detection System (SPACE)	07	21,578	49,300			49,300 U
320	1203940F	Space Situation Awareness Operations	07	18,920	17,834			17,834 U
321	1206423F	Global Positioning System III - Operational Control Segment	07	491,601	445,302			445,302 U
322	1206770F	Enterprise Ground Services	07		118,870			118,870 U
9999	9999999999	Classified Programs		16,832,438	17,785,996		78,713	17,864,709 U
		Operational Systems Development		22,982,541	24,480,992		83,913	24,564,905
Total Research, Development, Test & Eval, AF				41,419,014	45,566,955		128,248	45,695,203

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Line No	Program Element Number	Item	Act	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)	See
319	1203913F	NUDET Detection System (SPACE)	07						U
320	1203940F	Space Situation Awareness Operations	07						U
321	1206423F	Global Positioning System III - Operational Control Segment	07						U
322	1206770F	Enterprise Ground Services	07						U
9999	9999999999	Classified Programs		15,777,856				15,777,856	U
		Operational Systems Development		21,466,680		5,304	5,304	21,471,984	
		Total Research, Development, Test & Eval, AF		37,391,826		5,304	5,304	37,397,130	

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Summary Recap of Budget Activities -----					
Applied Research					
Advanced Component Development & Prototypes					
System Development & Demonstration					
Management Support					
Operational System Development					
Software & Digital Technology Pilot Programs					
Total Research, Development, Test & Evaluation					
Summary Recap of FYDP Programs -----					
Space					
Classified Programs					
Total Research, Development, Test & Evaluation					

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	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)
Summary Recap of Budget Activities -----					
Applied Research	130,874				130,874
Advanced Component Development & Prototypes	1,311,311				1,311,311
System Development & Demonstration	3,744,016				3,744,016
Management Support	258,510				258,510
Operational System Development	4,733,142				4,733,142
Software & Digital Technology Pilot Programs	149,742				149,742
Total Research, Development, Test & Evaluation	10,327,595				10,327,595
Summary Recap of FYDP Programs -----					
Space	6,694,729				6,694,729
Classified Programs	3,632,866				3,632,866
Total Research, Development, Test & Evaluation	10,327,595				10,327,595

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Conventional Munitions	0602602F	12	02.....	Volume 1 - 165
Conventional Weapons Technology	0603601F	31	03.....	Volume 1 - 451
Counterspace Systems	1206421F	120	05.....	Volume 2 - 885
Cyber Operations Technology Development	0306250F	66	04.....	Volume 2 - 363
Cyber Resiliency of Weapon Systems-ACS	0604414F	54	04.....	Volume 2 - 187

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Cyberspace Operations Forces and Force Support	0305251F	64	04.....	Volume 2 - 351
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Defense Joint Counterintelligence Activities	0305146F	262	07.....	Volume 3b - 251
Defense Laboratories R&D Projects (10 U.S.C, Sec 2358)	0602212F	10	02.....	Volume 1 - 159
Defense Research Sciences	0601102F	1	01.....	Volume 1 - 1
Deployment & Distribution Enterprise R&D	0604776F	55	04.....	Volume 2 - 217
Deployment & Distribution Enterprise R&D	0604776F	164	07.....	Volume 3a - 29
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Future AF Capabilities Applied Research	0602020F	4	02.....	Volume 1 - 25
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Future Advanced Weapon Analysis & Programs	0604200F	82	05.....	Volume 2 - 499
GPS III Follow-On (GPS IIIF)	1203269F	118	05.....	Volume 2 - 871
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General Skill Training	0804731F	153	06.....	Volume 2 - 1135
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Global Sensor Integrated on Network (GSIN)	1201017F	301	07.....	Volume 3b - 697
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HC/MC-130 Recap RDT&E	0605278F	169	07.....	Volume 3a - 79
Hard and Deeply Buried Target Defeat System (HDBTDS) Program	0604327F	53	04.....	Volume 2 - 177
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ICBM Fuze Modernization	0604933F	98	05.....	Volume 2 - 697
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Information Systems Security Program	0303140F	242	07.....	Volume 3b - 79
Initial Operational Test & Evaluation	0605712F	135	06.....	Volume 2 - 1039
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Integrated Broadcast Service (IBS)	1203179F	311	07.....	Volume 3b - 807
Integrated Strategic Planning & Analysis Network	0101324F	178	07.....	Volume 3a - 275
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Intelligence Advanced Development	0603260F	38	04.....	Volume 2 - 1
Intelligence Mission Data (IMD)	0307577F	277	07.....	Volume 3b - 429
Intercontinental Ballistic Missile - Dem/Val	0603851F	41	04.....	Volume 2 - 51
International Activities	1001004F	155	06.....	Volume 2 - 1137
International Intelligence Technology and Architectures	0305600F	274	07.....	Volume 3b - 409
JSpOC Mission System	1203614F	315	07.....	Volume 3b - 845

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Joint Counter RCIED Electronic Warfare	0205671F	185	07.....	Volume 3a - 347
Joint Cyber Command and Control (JCC2)	0208097F	223	07.....	Volume 3a - 793
Joint Direct Attack Munition	0604618F	93	05.....	Volume 2 - 645
Joint Personnel Recovery Agency	0901202F	295	07.....	Volume 3b - 621
Joint Tactical Network Center (JTNC)	0605030F	99	05.....	Volume 2 - 707
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KC-135s	0401218F	283	07.....	Volume 3b - 511
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Manned Destructive Suppression	0207136F	189	07.....	Volume 3a - 399
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NC3 Integration	0606018F	170	07.....	Volume 3a - 93
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National Airborne Ops Center (NAOC) Recap	0604288F	51	04.....	Volume 2 - 157
National Security Space Launch Program (SPACE) - EMD	1206853F	130	05.....	Volume 2 - 1005
National Space Defense Center	1203620F	316	07.....	Volume 3b - 865
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Next Gen Platform Dev/Demo	0603033F	19	03.....	Volume 1 - 263
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Nuclear Planning and Execution System (NPES)	0301112F	231	07.....	Volume 3b - 15
Nuclear Weapons Modernization	0101125F	105	05.....	Volume 2 - 767
Nuclear Weapons Support	0604222F	84	05.....	Volume 2 - 519
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PNT Resiliency, Mods, and Improvements	0604201F	83	05.....	Volume 2 - 509
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Science and Technology Management - Major Headquarters Activities	0602298F	11	02.....	Volume 1 - 163
Security and Investigative Activities	0305128F	260	07.....	Volume 3b - 231
Seek Eagle	0207590F	213	07.....	Volume 3a - 645
Service Support to SPACECOM Activities	1202140F	303	07.....	Volume 3b - 723
Service Support to STRATCOM - Space Activities	1201921F	302	07.....	Volume 3b - 705
Small Business Innovation Research	0605502F	134	06.....	Volume 2 - 1037
Small Diameter Bomb (SDB) - EMD	0604329F	88	05.....	Volume 2 - 585
Space & Missile Systems Center - MHA	1206398F	158	06.....	Volume 2 - 1151
Space Based Infrared System (SBIRS) High EMD	1206441F	127	05.....	Volume 2 - 953
Space Control Technology	1206438F	76	04.....	Volume 2 - 451
Space Fence	1206426F	123	05.....	Volume 2 - 915
Space Innovation, Integration and Rapid Technology Development	1203174F	310	07.....	Volume 3b - 799
Space Rapid Capabilities Office	1206857F	81	04.....	Volume 2 - 491
Space Security and Defense Program	1206730F	77	04.....	Volume 2 - 459
Space Situation Awareness Operations	1203940F	119	05.....	Volume 2 - 879
Space Situation Awareness Operations	1203940F	320	07.....	Volume 3b - 895
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Space Systems Prototype Transitions (SSPT)	1206427F	74	04.....	Volume 2 - 435
Space Technology	1206601F	16	02.....	Volume 1 - 219
Space Test Program (STP)	1206864F	161	06.....	Volume 2 - 1163
Space Test and Training Range Development	1206116F	156	06.....	Volume 2 - 1143
Space and Missile Test and Evaluation Center	1203173F	309	07.....	Volume 3b - 783
Spacelift Range System (SPACE)	1203182F	312	07.....	Volume 3b - 815
Special Tactics / Combat Control	0408011F	288	07.....	Volume 3b - 545
Specialized Undergraduate Flight Training	0604233F	163	07.....	Volume 3a - 9
Stand In Attack Weapon	0207328F	107	05.....	Volume 2 - 785
Submunitions	0604604F	91	05.....	Volume 2 - 621
Support Systems Development	0708611F	292	07.....	Volume 3b - 599
Support to DCGS Enterprise	0305240F	273	07.....	Volume 3b - 395
Sustainment Science and Technology (S&T)	0603199F	23	03.....	Volume 1 - 353
Tactical AIM Missiles	0207161F	193	07.....	Volume 3a - 463
Tactical Air Control Party-Mod	0207444F	208	07.....	Volume 3a - 599
Tactical Data Networks Enterprise	0604281F	86	05.....	Volume 2 - 551
Tactical Deception	0208007F	219	07.....	Volume 3a - 723
Tactically Responsive Launch	1206862F	160	06.....	Volume 2 - 1159

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Tech Transition Program	0604858F	56	04.....	Volume 2 - 247
Technology Transfer	0604317F	52	04.....	Volume 2 - 165
Test and Evaluation Support	0605807F	136	06.....	Volume 2 - 1047
Theater Battle Management (TBM) C4I	0207438F	207	07.....	Volume 3a - 593
Threat Simulator Development	0604256F	131	06.....	Volume 2 - 1015
Three Dimensional Long-Range Radar (3DELRR)	0207455F	60	04.....	Volume 2 - 307
Training Developments	0804772F	115	05.....	Volume 2 - 853
UH-1N Replacement Program	0102110F	181	07.....	Volume 3a - 291
USAF Modeling and Simulation	0207601F	214	07.....	Volume 3a - 655
Unified Platform (UP)	0208099F	62	04.....	Volume 2 - 323
Unified Platform (UP)	0208099F	224	07.....	Volume 3a - 801
University Research Initiatives	0601103F	2	01.....	Volume 1 - 17
VC-25B	0401319F	113	05.....	Volume 2 - 837
Wargaming and Simulation Centers	0207605F	215	07.....	Volume 3a - 671
Weather Service	0305111F	255	07.....	Volume 3b - 189
Weather System Follow-on	1206422F	72	04.....	Volume 2 - 415
Weather System Follow-on	1206422F	121	05.....	Volume 2 - 903
Wide Area Surveillance	0604445F	35	03.....	Volume 1 - 493
Wideband Global SATCOM (SPACE)	1206433F	126	05.....	Volume 2 - 947

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Worldwide Joint Strategic Communications	0101316F	177	07.....	Volume 3a - 267

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603260F / <i>Intelligence Advanced Development</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	5.568	5.672	4.320	0.000	4.320	5.882	5.986	6.092	3.708	Continuing	Continuing
64536A: <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>	-	4.421	4.503	3.132	0.000	3.132	4.669	4.751	4.835	2.428	Continuing	Continuing
64537A: <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>	-	1.147	1.169	1.188	0.000	1.188	1.213	1.235	1.257	1.280	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

Intelligence Advanced Development (IAD) develops and demonstrates technology required to support warfighter needs for timely all source intelligence information. IAD supports global awareness, consistent battlespace knowledge, precision information, and the execution of time critical missions. IAD focuses on enhancing defense intelligence capabilities through exploration and development of innovative tools including data analytics for mining and exploitation, machine-learning, and software automation. IAD projects provide improved on-time information to the warfighter using new and existing data sources, streamlining data analysis, thus reducing the footprint required, and enhancing performance. These support the Anti-Access/Area Denial (A2/AD) Contested/Congested Degraded Operations (CDO) problem set. The Air Force Research Lab, Rome Research Site, Information Intelligence Systems and Analysis Division (AFRL/RIE), works directly with users, employing evolutionary approaches and integrating finished modules directly into the field. The programs are oriented toward specific shortfalls and deficiencies as documented by the Major Commands (MAJCOMs), Unified Commands, and intelligence organizations in their mission and functional area plans. This PE expedites technology transition from the laboratory to operational users via rapid prototyping. It is focused on technology insertion to correct AF intelligence deficiencies at the tactical and operational levels. The PE bridges the transition of new technologies from Advance Technology Demonstrations (ATDs) and Integrated Technology Thrust Programs (ITTPs) into current/new systems, and supports the associated Defense Technology Objectives (DTOs). IAD may also reallocate existing resources to support out-of-cycle new/ updated warfighter requirements.

Requirements for this PE are identified and prioritized by Air Combat Command (ACC). Development of new/improved capabilities to meet the requirements are managed by AFRL/RIE. Prototype products, usually in the form of software, are provided to users in incremental capability spirals for operational environment evaluation.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Intelligence Advanced Development capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603260F / <i>Intelligence Advanced Development</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	5.568	5.672	5.770	0.000	5.770
Current President's Budget	5.568	5.672	4.320	0.000	4.320
Total Adjustments	0.000	0.000	-1.450	0.000	-1.450
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-1.450	0.000	-1.450

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603260F / <i>Intelligence Advanced Development</i>				<b>Project (Number/Name)</b> 64536A / <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
64536A: <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>	-	4.421	4.503	3.132	0.000	3.132	4.669	4.751	4.835	2.428	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The mission is to develop prototypes which encompass several areas of intelligence exploitation including the advancement of all source correlation and fusion for the intelligence analyst. Projects include development of innovative data analytics, machine-learning, and automated software tools. The intent is to enhance the overall situational awareness for Air Force, DoD, and Coalition groups which have requirements to correlate various sources of intelligence information, including Communications Intelligence (COMINT), Electronics Intelligence (ELINT), Imagery Intelligence (IMINT), Geospatial Intelligence (GEOINT), Measurement and Signature Intelligence (MASINT), Signals Intelligence (SIGINT), Publicly Available Information (PAI) and others, in a timely manner. IET may reallocate existing resources to support out-of-cycle new/updated warfighter requirements.

The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Intelligence Exploitation Tools (IET)	4.421	4.503	3.132
<b>Description:</b> IET addresses the accurate and timely interpretation of various Intelligence data sources (such as digital imagery, video, documents, signals) by developing and evaluating methods to index, exploit, and manipulate disparate data products using analytics, machine-learning, and software automation. This provides the analyst with the ability to rapidly search and fuse multiple intelligence sources for improved situational awareness and to better detect anomalies. Cross domain tools enable data exploitation at multiple classification levels. In addition, methods to improve analysis of current and future foreign weapon systems are developed. IET provides enhanced warning and accuracy to allow national and military authorities a greater range of options to avert, diminish or control a crisis.			
<b>FY 2020 Plans:</b>			
- Completing development of software focused on improving the way computers and application services supports intelligence analysts through the use of cognitive systems			
- Completing the development of automated methods that aid in the systematic, continuous, and comprehensive assessment of technical topic, concepts and emergence using information found in the published scientific, technical and patent literature, message traffic, gray literature, and conference papers			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603260F / <i>Intelligence Advanced Development</i>	<b>Project (Number/Name)</b> 64536A / <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>- Completing the enabling of Distributed Common Ground Station (DCGS) enterprise support of high-altitude SIGINT missions and execution on NSANet</li> <li>- Complete development of software capability to exploit and fuse Publicly Available Information w/ DCGS related sources</li> <li>- Development of a Feature Extractor to assist automation of Tech ELINT screening</li> <li>- Development and integration of space based modeling capabilities into the Integrated Many on Many (IMOM) mission planning tool</li> <li>- Continue implementation of operational metadata capability for DCGS SIGINT collection systems</li> <li>- Developing Mobile Command, Control, Communication, and Computer (Mobile C4) database and visualization capability for intelligence operators; integrated into National Air and Space Intelligence Center (NASIC) toolset</li> <li>- Developing automated artificial intelligent systems and modeling and simulation tools for understanding and visualizing patterns of life, for detecting vulnerabilities in weapon systems, and for the analysis of targets from multi-INT data in various threat environments</li> <li>- Developing multi-INT entity resolution capabilities, utilizing cataloged repositories, which will enable analysts to apply automated machine intelligence and prediction tools to identify trends and mission statistics for SIGINT and DCGS users</li> <li>- Adding automation to a live PED tasking order workflow by ingesting mission data, flying schedules, &amp; authorized service interruptions, enabling user-defined rolls that allow mission change requests &amp; verification of mission changes to occur between C2 node &amp; PED sites prior to final publication &amp; sharing with the larger community</li> <li>- Conduct user evaluations and prototype releases</li> </ul> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will complete development and integration of space based modeling capabilities into the Integrated Many on Many (IMOM) mission planning tool</li> <li>- Will continue implementation of operational metadata capability for DCGS SIGINT collection systems</li> </ul>			



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603260F / <i>Intelligence Advanced Development</i>	<b>Project (Number/Name)</b> 64536A / <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>- Will continue Mobile Command, Control, Communication, and Computer (Mobile C4) database and visualization capability for intelligence operators; integrated into National Air and Space Intelligence Center (NASIC) toolset</p> <p>- Will develop automated artificial intelligent systems and modeling and simulation tools for understanding and visualizing patterns of life, for detecting vulnerabilities in weapon systems, and for the analysis of targets from multi-INT data in various threat environments</p> <p>- Will develop multi-INT entity resolution capabilities, utilizing cataloged repositories, which will enable analysts to apply automated machine intelligence and prediction tools to identify trends and mission statistics for SIGINT and DCGS users</p> <p>- Will add automation to a live PED tasking order workflow by ingesting mission data, flying schedules, &amp; authorized service interruptions, enabling user-defined rolls that allow mission change requests &amp; verification of mission changes to occur between C2 node &amp; PED sites prior to final publication &amp; sharing with the larger community</p> <p>- Will continue user evaluations and prototype releases</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Minor increase supporting final prototype evaluations</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		4.421	4.503	3.132
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
Requirements for new/improved techniques for operational employment of simulation models are identified and prioritized by ACC. Development of the new/improved capabilities to meet these requirements is managed by Air Force Research Laboratory (AFRL) Rome Research Site. Prototype products (usually software), once evaluated by the users, are transitioned from the laboratory to the operational community in spirals. All major contracts within this project are awarded after full and open competition.				



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603260F / <i>Intelligence Advanced Development</i>	<b>Project (Number/Name)</b> 64536A / <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>IET</b>	
IET Development	
Software to improve support to intelligence analysts through cognitive systems	
Automated methods for assessment of technical topics, concepts, and emergence	
DCGS enterprise support to high-altitude SIGINT missions	
Exploit and fuse Publicly Available Information with DCGS related sources	
Feature Extractor to assist automation in Tech ELINT	
Space based modeling capabilities into IMOM mission planning tool	
Operational metadata capability for DCGS SIGINT collection systems	
Multi INT data mining tools for patterns of life & weapon sys vulnerabilities	
FY19 IET User Evaluations & Prototype Releases	
FY20 IET User Evaluations & Prototype Releases	
FY21 IET User Evaluations & Prototype Releases	
FY22 IET User Evaluations & Prototype Releases	



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603260F / <i>Intelligence Advanced Development</i>	<b>Project (Number/Name)</b> 64536A / <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>IET</i></b>				
IET Development	1	2019	4	2025
Software to improve support to intelligence analysts through cognitive systems	1	2019	4	2019
Automated methods for assessment of technical topics, concepts, and emergence	1	2019	4	2019
DCGS enterprise support to high-altitude SIGINT missions	1	2019	4	2021
Exploit and fuse Publicly Available Information with DCGS related sources	1	2019	4	2019
Feature Extractor to assist automation in Tech ELINT	1	2019	4	2020
Space based modeling capabilities into IMOM mission planning tool	1	2019	4	2020
Operational metadata capability for DCGS SIGINT collection systems	1	2019	4	2020
Multi INT data mining tools for patterns of life & weapon sys vulnerabilities	3	2019	4	2021
FY19 IET User Evaluations & Prototype Releases	1	2019	4	2019
FY20 IET User Evaluations & Prototype Releases	1	2020	4	2020
FY21 IET User Evaluations & Prototype Releases	1	2021	4	2021
FY22 IET User Evaluations & Prototype Releases	1	2022	4	2022
FY23 IET User Evaluations & Prototype Releases	1	2023	4	2023
FY24 IET User Evaluations & Prototype Releases	1	2024	4	2024
FY25 IET User Evaluations & Prototype Releases	1	2025	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603260F / <i>Intelligence Advanced Development</i>				<b>Project (Number/Name)</b> 64537A / <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
64537A: <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>	-	1.147	1.169	1.188	0.000	1.188	1.213	1.235	1.257	1.280	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The mission is to provide continuing development and upgrades of threat analysis capabilities to produce integrated, predictive air and space intelligence to enable military operations, force modernization decisions, and policy making. Products from IAC allow the Intelligence Analyst to accelerate and increase the accuracy of threat estimates and system descriptions to deployed operational forces. Each of the development projects within the IAC program portfolio transition technologies to the operational communities through the incremental release of upgraded versions over a period of years as development projects progress towards the final configuration. IAC may reallocate existing resources to support out-of-cycle new/ updated warfighter requirements.

The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Intelligence Analysis Capabilities (IAC) Development	1.147	1.169	1.188
<b>Description:</b> IAC develops tools and algorithms for Intelligence Analysts with the ability to produce accurate, predictive, relevant, and timely intelligence that supports client processes, operational planning, and mission execution. Methods include data analytics techniques, machine-learning, and software automation. IAC develops new and upgraded analysis, modeling and simulation tools focused on intelligence production supporting AF operational and developmental all source analysis functions.			
<b>FY 2020 Plans:</b>			
- Development of a query class prototype system that will enable users to search large volumes of disparate multimodal and multilingual data sources; this service will be accessible for use by DoD and Intelligence Community (IC) cloud service architectures			
- Development of a prototype Modeling and Simulation tool to address the need for improved threat Integrated Air Defense (IADS) passive detection/tracking and combat identification			
- Development Mobile Command, Control, Communication, and Computer (Mobile C4) database and visualization capability for intelligence operators; integrated into National Air and Space Intelligence Center (NASIC) toolset			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603260F / <i>Intelligence Advanced Development</i>	<b>Project (Number/Name)</b> 64537A / <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>- Development of a prototype for providing improved Electronic Warfare (EW) information to operational users by leveraging the capabilities of the modernized, national EW databases; this will include signal identification, waveform ambiguity detection and emitter descriptions across all three national EW databases</li> <li>- Development of a machine learning (ML) collaboration &amp; deployment framework for AF DCGS; provide intel ops with an intuitive environment that simplifies deployment/sharing of ML algorithms/models &amp; operational intel datasets</li> <li>- User evaluations and prototype releases</li> </ul> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will continue development of a query class prototype system that will enable users to search large volumes of disparate multimodal and multilingual data sources; this service will be accessible for use by DoD and Intelligence Community (IC) cloud service architectures</li> <li>- Will continue development of a prototype Modeling and Simulation tool to address the need for improved threat Integrated Air Defense (IADS) passive detection/tracking and combat identification</li> <li>- Will continue development Mobile Command, Control, Communication, and Computer (Mobile C4) database and visualization capability for intelligence operators; integrated into National Air and Space Intelligence Center (NASIC) toolset</li> <li>- Will continue development of a prototype for providing improved Electronic Warfare (EW) information to operational users by leveraging the capabilities of the modernized, national EW databases; this will include signal identification, waveform ambiguity detection and emitter descriptions across all three national EW databases</li> <li>- Will continue development of a machine learning (ML) collaboration &amp; deployment framework for AF DCGS; provide intel ops with an intuitive environment that simplifies deployment/sharing of ML algorithms/models &amp; operational intel datasets</li> <li>- Will continue user evaluations and prototype releases</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Minor increase to support user evaluations</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		1.147	1.169	1.188

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>	Project (Number/Name) 64537A / INTELLIGENCE ANALYSIS CAPABILITIES (IAC)

**C. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**D. Acquisition Strategy**

Requirements of new/upgraded intelligence analysis tools are identified and prioritized by the ACC. Development of capabilities to meet these requirements is managed by AFRL Rome Research Site. Prototype products (usually software), once evaluated by the users, are fielded in incremental capability spirals. All major contracts within this project are awarded after full and open competition.





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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603260F / <i>Intelligence Advanced Development</i>	<b>Project (Number/Name)</b> 64537A / <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>IAC</b>																												
IAC Development																												
Query class system to search large volumes of multimodal / multilingual sources																												
Modeling and Simulation for improved IADS passive detection/tracking and combat ID																												
Mobile C4 database and visualization for intelligence operators																												
Improved EW information by leveraging capabilities of modernized national EW databases																												
Framework for sharing machine learning algorithms/models & operational intel datasets																												
FY19 IAC User Evaluations & Prototype Releases																												
FY20 IAC User Evaluations & Prototype Releases																												
FY21 IAC User Evaluations & Prototype Releases																												
FY22 IAC User Evaluations & Prototype Releases																												
FY23 IAC User Evaluations & Prototype Releases																												
FY24 IAC User Evaluations & Prototype Releases																												
FY25 IAC User Evaluations & Prototype Releases																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603260F / <i>Intelligence Advanced Development</i>	<b>Project (Number/Name)</b> 64537A / <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>IAC</b>				
IAC Development	1	2019	4	2025
Query class system to search large volumes of multimodal / multilingual sources	1	2019	4	2021
Modeling and Simulation for improved IADS passive detection/tracking and combat ID	1	2019	4	2021
Mobile C4 database and visualization for intelligence operators	1	2019	4	2021
Improved EW information by leveraging capabilities of modernized national EW databases	1	2019	4	2020
Framework for sharing machine learning algorithms/models & operational intel datasets	2	2019	4	2020
FY19 IAC User Evaluations & Prototype Releases	1	2019	4	2019
FY20 IAC User Evaluations & Prototype Releases	1	2020	4	2020
FY21 IAC User Evaluations & Prototype Releases	1	2021	4	2021
FY22 IAC User Evaluations & Prototype Releases	1	2022	4	2022
FY23 IAC User Evaluations & Prototype Releases	1	2023	4	2023
FY24 IAC User Evaluations & Prototype Releases	1	2024	4	2024
FY25 IAC User Evaluations & Prototype Releases	1	2025	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>					<b>R-1 Program Element (Number/Name)</b>							
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					PE 0603742F I <i>Combat Identification Technology</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	17.561	32.085	26.396	0.000	26.396	24.797	25.241	25.692	26.165	Continuing	Continuing
642597: <i>Noncooperative Identification Subsystems</i>	-	17.561	24.545	22.124	0.000	22.124	20.019	20.427	20.941	21.325	Continuing	Continuing
642599: <i>Cooperative Identification Techniques</i>	-	0.000	2.040	2.076	0.000	2.076	2.082	2.119	2.156	2.197	Continuing	Continuing
643420: <i>Combat ID Database Development</i>	-	0.000	5.500	2.196	0.000	2.196	2.696	2.695	2.595	2.643	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

Combat Identification (CID) is the process of determining the identity of an entity in the battlespace. It is essential to determine if that entity is a friend, neutral or enemy; and if an enemy, the nature of the entity determines how it should be engaged. The CID team's mission is to identify new and promising CID technology candidates, evaluate the usefulness of the technologies, conduct demonstrations in operationally relevant environments, and coordinate strategies that expedite transition to more than one platform. This PE aims to integrate and transition new capabilities into fielded systems, and improve existing capabilities. The mission area consists of two thrusts: cooperative CID and non-cooperative CID. Cooperative CID systems require communication between two participating platforms. Non-cooperative CID techniques do not depend on a response from the targeted platform - such as high range resolution radar that measures the length of a target. Both cooperative and non-cooperative CID techniques are currently in the field, and are necessary elements of the kill chain that ensure mission success and reduce fratricide.

Non-cooperative CID employs a number of sensing technologies and signal processing techniques. The observations are compared to a database to identify battlespace entities. These technologies include: (1) Laser Vision, an Electro-Optical/Infrared (EO/IR) imaging system that significantly increases ID ranges; (2) Hydra Vision, a balanced (robust) amalgamation of sensor data from multiple sources to provide warfighters with higher confidence CID results on surface or air targets, fusion to counter camouflage, concealment and deception (CCD), and multi-phenomenology features for sustainable databases; (3) Compact Aided Target Recognition (AiTR) and Sustainable Environments (CASE), a CID approach that focuses on tailoring algorithms to use smaller, more efficient databases that are faster and less expensive to generate and maintain; (4) Passive Radio Frequency (RF) ID Environment (PRIDE), a program to develop passive RF target ID capability for denied access environment using passive RF and electronic warfare (EW) information; (5) Radio ID (RID), a program to develop methods for using advances in digital radio technologies such as software defined radios to provide low cost ID solutions to enhance CID, improve aircrew situational awareness and assist in fratricide prevention with military and civil air platforms, potentially fusing non-cooperative techniques and cooperative technologies; (6) Enhanced Combat ID (ECID), a program under Studies to develop a robust ability to quantitatively evaluate promising CID technologies using enhanced modeling and simulation (M&S) capabilities; and (7) Kill-chain Weapon Integrated CID (KWIC), a program that seeks to modify Air to Ground sensors to provide better situational and combat identification of target area.

Cooperative Combat Identification (CID) employs technologies required to rapidly identify friendly platforms. The program develops, integrates and evaluates technologies that provide AF platforms with a means of positively identifying an air or ground platform as a friendly, via active or passive cooperative identification capabilities. Development funded by this project ensures availability of a Mode 5 upgrade path for implementing ground and air platforms across the Air Force fleet.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

**Appropriation/Budget Activity**  
3600: *Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)*

**R-1 Program Element (Number/Name)**  
PE 0603742F *I Combat Identification Technology*

The Combat ID (CID) Database Initiative (DBI) effort is a project under the Combat Identification (CID) portfolio and is designed to remove the "hard-coded" static ID parameters from the host platform's sensor and replace them with parameterized values that are dynamic. The DBI project primarily consists of four efforts: a.) determining the requisite ID parameters for CID, b) designing and developing a database to contain the CID parameters identified in Task a, c) developing techniques to generate the requisite parameters, and d) provide CID parameters developed from measured or modeled data. This project is projected to begin in early FY-20 therefore no funds have been required/requested previously.

In FY21 our non-cooperative goals will be to complete the first transition of a feature-level fusion ATR capability for air targets onto F-16 AESA aircraft under Air to Air Hydravision, providing a substantial improvement in CID performance at long range. This effort will lead the way for other platforms to integrate this capability. AAHV will also transition a major improvement in air target CID to the F-15E AESA aircraft. CASE will be in the final demonstration phase of a significant ground target CID capability that will transition to F-15E AESA and F/A-18 AESA the following year. VAMP and 3DTO will both be preparing to transition CID capability to Litening in FY21. FY21 will see the initiation of three major programs, to include Integrated Determination of ID (ID2) - using advances associated with Joint Multisensor Advanced CID (JMAC) to provide feature-level fusion to ground target ID; Integrated Combat ID with EW (ICE), pulling EW-specific features into feature-level fusion; and Kill Chain Weapons Integrated CID (KWIC), using information from launched weapons through a back link to provide CID from within the hot battlespace.

In FY21, cooperative goals will be to test and certify the responsibilities for the present Mark XII system, develop and integrate the new Mark XIIA (Mode 5) IFF system, and also the development/integration of civil Mode S capabilities into Mark XIIA IFF equipment. The cooperative funds will be used to fund project and test engineers who will develop and test standards, perform certification testing in the field, process certifications and track all OSD/FAA guidelines to insure the program remains current. The OSD/FAA guidelines require Mode 5 be fully implemented by 2020 and the AIMS Program will insure those certifications are current on all applicable platforms/systems and work with both domestic and foreign military sales partners to insure compliance. The funds also support DOD representation to several military (US and NATO) and civil (FAA, ICAO and RTCA) requirements meetings for Mode 5, Mode S and ADS-B.

In FY-21, the DBI effort will determine the requisite CID features for High Range Resolution (HRR) and Non Cooperative Target Recognition (NCTR) air to air modes; specify the requirements for initial CID database design for these radar modes; and collect initial sample data to populate the HRR and NCTR databases for developmental test/debug. Databases for other CID modalities will be added over time (e.g., air to air ground radar modes, 3-D LADAR, etc.)

Activities also include studies and analysis to support both current program planning and execution and future program planning.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Combat Identification technologies. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	PE 0603742F / <i>Combat Identification Technology</i>

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	18.194	27.085	26.444	0.000	26.444
Current President's Budget	17.561	32.085	26.396	0.000	26.396
Total Adjustments	-0.633	5.000	-0.048	0.000	-0.048
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.633	0.000	-0.048	0.000	-0.048

**Change Summary Explanation**

This funding will enable the CID portfolio to continue developing critical CID technologies.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>				<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
642597: <i>Noncooperative Identification Subsystems</i>	-	17.561	24.545	22.124	0.000	22.124	20.019	20.427	20.941	21.325	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Non-cooperative CID employs a number of sensing technologies and signal processing techniques. The observations are compared to a database to identify battlespace entities. These technologies include: (1) Laser Vision, an Electro-Optical/Infrared (EO/IR) imaging system that significantly increases ID ranges; (2) Hydra Vision, a balanced (robust) amalgamation of sensor data from multiple sources to provide warfighters with higher confidence CID results on surface or air targets, fusion to counter camouflage, concealment and deception (CCD), and multi-phenomenology features for sustainable databases; (3) Compact Aided Target Recognition (AiTR) and Sustainable Environments (CASE), a CID approach that focuses on tailoring algorithms to use smaller, more efficient databases that are faster and less expensive to generate and maintain; (4) Passive Radio Frequency (RF) ID Environment (PRIDE), a program to develop passive RF target ID capability for denied access environment using passive RF and electronic warfare (EW) information; (5) Radio ID (RID), a program to develop methods for using advances in digital radio technologies such as software defined radios to provide low cost ID solutions to enhance CID, improve aircrew situational awareness and assist in fratricide prevention with military and civil air platforms, potentially fusing non-cooperative techniques and cooperative technologies; (6) Enhanced Combat ID (ECID), a program under Studies to develop a robust ability to quantitatively evaluate promising CID technologies using enhanced modeling and simulation (M&S) capabilities; and (7) Kill-chain Weapon Integrated CID (KWIC), a program that seeks to modify Air to Ground sensors to provide better situational and combat identification of target area.

In FY21 our non-cooperative goals will be to complete the first transition of a feature-level fusion ATR capability for air targets onto F-16 AESA aircraft under Air to Air Hydravision, providing a substantial improvement in CID performance at long range. This effort will lead the way for other platforms to integrate this capability. AAHV will also transition a major improvement in air target CID to the F-15E AESA aircraft. CASE will be in the final demonstration phase of a significant ground target CID capability that will transition to F-15E AESA and F/A-18 AESA the following year. VAMP and 3DTO will both be preparing to transition CID capability to Litening in FY21. FY21 will see the initiation of three major programs, to include Integrated Determination of ID (ID2) - using advances associated with Joint Multisensor Advanced CID (JMAC) to provide feature-level fusion to ground target ID; Integrated Combat ID with EW (ICE), pulling EW-specific features into feature-level fusion; and Kill Chain Weapons Integrated CID (KWIC), using information from launched weapons through a back link to provide CID from within the hot battlespace.

Activities also include studies and analysis to support both current program planning and execution and future program planning.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Combat Identification technologies. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p><b>Title:</b> Laser Vision</p> <p><b>Description:</b> The Vibrometry Advanced Mode Processor (VAMP) program develops advanced algorithms for processing data provided by laser vibrometry sensors to demonstrate prototype pilot Aided Target Recognition software. This leverage ability of active electro-optic sensors to sense micro-displacements of operating machinery to measure the resulting frequency spectrum. The program will assess utility for air-to-ground CID. FY20/21 - will apply AiTR algorithms to determine how well the technology can separate target classes.</p> <p>Laser Vision is part of a family of electro-optical (EO) systems that significantly increase ID ranges. It provides the demonstration and evaluation data necessary to support decisions on future EO technologies supporting CID, including 3-D (3-dimensional) imaging laser radar (Ladar) and exploration of advanced concepts. The 3-D ladar technology provides a display of a 3-D EO image to the pilot for high confidence combat identification and is a potential for the next generation targeting pods for the USAF.</p> <p>The Multi-Mode Ladar Aided Target Recognition (M2LATR), which combines the work of 3DTO (3D laser imaging) and SIREN/VAMP (laser vibrometry), to create a longer-range fused-feature CID technique that uses the combined orthogonal features of both systems to provide a robust long-range CID capability.</p> <p><b>FY 2020 Plans:</b> Completing testing and evaluation.</p> <p><b>FY 2021 Base Plans:</b> Will integrate (M2L) 3DTO and VAMP work into new, more capable package.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease is due to VAMP work winding down with 3DTO efforts wrapping up in FY20/21; emphasis shifts to M2L integration.</p>	2.572	3.920	3.100	-	3.100
<p><b>Title:</b> Hydra Vision/Air to Air</p> <p><b>Description:</b> Hydra Vision (Multi-Sensor Enhanced ID) is a balanced (robust) amalgamation of sensor data from multiple sources to provide warfighters with higher confidence CID results on surface or air targets. There are two main thrusts occurring simultaneously, Air-to-Air and Air-to-Ground.</p> <p><b>FY 2020 Plans:</b> - Continuing to generate models and update database information</p>	6.923	5.100	4.778	-	4.778

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>			
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
- Examining all flight demonstrations of technology development <b>FY 2021 Base Plans:</b> Will further development of feature level fusion that will be integrated into a tactical platform's mission computer. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease is due to increased Program Office contribution as one of the capabilities approaches transition this will require less from the CID PE.					
<b>Title:</b> Compact AiTR (Aided Target Recognition) and Sustainable Environment (CASE) <b>Description:</b> CASE is a family of efforts to address efficiency and sustainability issues associated with the development, operation and maintenance of non-cooperative AiTR technology. Develop sustainable multi-phenomenology AiTR based on low fidelity, compact, and inexpensive database technology. <b>FY 2020 Plans:</b> - Examining all flight demonstrations <b>FY 2021 Base Plans:</b> Will transition SAR ATR capability to NASIC in FY21; nearing completion. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> decrease is due to project approaching completion.	2.750	2.666	0.700	-	0.700
<b>Title:</b> Passive RF ID Environment (PRIDE) <b>Description:</b> Develop passive RF target ID capability for denied access environment utilizing passive RF and EW information with potential non-traditional ISR capabilities. <b>FY 2020 Plans:</b> Continuing to develop techniques that will assist in the transitioning of ISR capabilities <b>FY 2021 Base Plans:</b> Will continue expansion of higher-offset-angle synthetic aperture radar bistatic mode. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Slight reduction in funding associated with reduction in activity from Sandia National Laboratory as their role in the program comes to a close.	0.710	4.880	4.691	-	4.691
<b>Title:</b> Radio ID (RID)	1.325	3.058	3.919	-	3.919

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p><b>Description:</b> RID will develop technologies to integrate radio based cooperative technologies with non-cooperative technologies into the cockpit. The benefits will be increased confidence target ID and situational awareness as well as reduced fratricides.</p> <p><b>FY 2020 Plans:</b> - Performing lab demonstrations - Continuing to develop integrative radio based cooperative technologies</p> <p><b>FY 2021 Base Plans:</b> Will execute the first airborne demonstration of the technology.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increased funding required for contractors conducting the first airborne demonstration.</p>					
<p><b>Title:</b> Studies</p> <p><b>Description:</b> Conduct CID-related studies/demos.</p> <p><b>FY 2020 Plans:</b> Continuing to perform system designs and continue to develop algorithms.</p> <p><b>FY 2021 Base Plans:</b> Will shake out advanced concepts to determine if they will become development projects. These include integration of electronic warfare features as a CID source; upgrades to synthetic aperture radar (SAR) CID; extraction of features from sensors on flyout weapons; and a variety of modeling and simulation efforts.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Slight increase in funding for upgraded SAR CID as that technology matures.</p>	3.281	4.921	4.281	-	4.281
<p><b>Title:</b> Kill-chain Weapon Integrated CID (KWIC)</p> <p><b>Description:</b> KWIC will use air to ground sensors to provide better situational awareness and Combat ID of target area</p> <p><b>FY 2020 Plans:</b></p>	0.000	0.000	0.655	-	0.655

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>KWIC Program was initially a study effort in FY20. Technology developed and matured to the point it was decided to make it a distinct effort in FY21.</p> <p><b>FY 2021 Base Plans:</b> KWIC program effort continues with feature extraction and algorithm development</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Program moves from study effort to further development in FY21</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	17.561	24.545	22.124	-	22.124

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Combat Identification develops technologies for exploitation by the USAF and other services. Award multiple, competitive contract vehicles emphasizing off-the-shelf technology and maximizing the use of non-developmental items (NDIs). Management develops a technology to a point it can be demonstrated in a relative combat environment.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Hydra Vision (Air-to-Air) - L	C/CPFF	Leidos : Reston, VA	-	0.995	Oct 2018	1.000	Feb 2020	1.000	Jan 2021	-		1.000	Continuing	Continuing	-
Hydra Vision, Target Recognition & Tracking Technology	MIPR	Sandia : Albuquerque, NM	-	0.450	Mar 2019	1.000	Feb 2020	0.500	Oct 2020	-		0.500	Continuing	Continuing	-
Studies - ECID OMS SME	C/CPAF	Ball Aerospace : MD	-	0.000	Dec 2018	0.100	Mar 2020	0.000	Dec 2020	-		0.000	Continuing	Continuing	-
Studies - ECID	PO	AFIT : Dayton, OH	-	0.000	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	-
CASE - Compact AiTR and Sustainable Environment Analysis - L	C/CPFF	Leidos : Mclean, VA	-	0.800	Nov 2018	1.066	Jan 2020	0.500	Jan 2021	-		0.500	Continuing	Continuing	-
Passive Radar Identification Environment (PRIDE) - L	C/CPFF	Leidos : Mclean, VA	-	0.610	Jan 2019	3.000	Feb 2020	3.000	Oct 2020	-		3.000	Continuing	Continuing	-
Passive Radar Identification Environment (PRIDE) -STR	C/CPFF	Systems and Technology Research : Woburn, MA	-	0.000	Jan 2019	0.000		0.000		-		0.000	Continuing	Continuing	-
Passive Radar Identification Environment (PRIDE) - IAI	C/CPFF	Integrated Applications Inc : Chantilly, VA	-	0.000	Jan 2019	0.000		0.000		-		0.000	Continuing	Continuing	-
Radio Identification (RID)	MIPR	DMEA : Sacramento, CA	-	1.325	Feb 2019	3.058	Feb 2020	4.000	Feb 2021	-		4.000	Continuing	Continuing	-
M2LATR	C/CPFF	TBD : TBD	-	0.000	Aug 2019	2.070	Mar 2020	2.650	Mar 2021	-		2.650	Continuing	Continuing	-
VAMP	C/CPAF	Northrop Grumman : Rolling Meadows, IL	-	1.800	Feb 2019	1.250	Feb 2020	0.450	Jan 2021	-		0.450	Continuing	Continuing	-
3DTO MASTER	C/CPAF	DEC : Beavercreek, OH	-	0.400	Jul 2019	0.600	Mar 2020	-		-		-	Continuing	Continuing	-
Infoscitex	C/CPAF	Infoscitex : Dayton, OH	-	0.100	Mar 2019	0.130	Mar 2020	0.130	Mar 2021	-		0.130	Continuing	Continuing	-
PRECISE-N	C/CPAF	Northrop Grumman : Baltimore, MD	-	3.018	Oct 2018	1.800	Jan 2020	1.700	Jan 2021	-		1.700	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
PRECISE-R	C/CPAF	Raytheon : El Segundo, CA	-	2.618	Nov 2018	1.800	Jan 2020	1.528	Jan 2021	-		1.528	Continuing	Continuing	-
CAST	MIPR	DMEA : Sacramento, CA	-	1.700	Dec 2018	1.200	Jan 2020	0.300	Jan 2021	-		0.300	Continuing	Continuing	-
Concept Call #1	C/CPAF	TBD : TBD	-	-		0.100	May 2020	0.200	May 2021	-		0.200	Continuing	Continuing	-
Concept Call #2	C/CPAF	TBD : TBD	-	-		-		0.100	May 2021	-		0.100	Continuing	Continuing	-
Integrated Determination of IDs (ID2)	C/CPAF	TBD : TBD	-	-		0.500	Mar 2020	0.408	Mar 2021	-		0.408	Continuing	Continuing	-
Integrated CID EW	C/CPAF	TBD : TBD	-	-		0.500	Dec 2019	0.408		-		0.408	Continuing	Continuing	-
Kill Chain Weapons Integrated CID	C/CPAF	TBD : TBD	-	-		0.480	Jan 2020	0.655	Jan 2021	-		0.655	Continuing	Continuing	-
AFSIM Development	C/CPAF	TBD : TBD	-	-		0.200	Feb 2020	0.100	Feb 2021	-		0.100	Continuing	Continuing	-
JMAC Integration	C/CPAF	TBD : TBD	-	-		0.183	Feb 2020	0.159	Feb 2021	-		0.159	Continuing	Continuing	-
<b>Subtotal</b>			-	13.816		20.037		17.788		-		17.788	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Systems Engineering Support	MIPR	MITRE : Rome, NY	-	0.193	Mar 2019	0.200	Dec 2019	0.000		-		0.000	Continuing	Continuing	-
Systems Frontier Support	MIPR	Frontier Technology : Dayton, OH	-	0.125	Jul 2019	0.150	May 2020	0.150	May 2021	-		0.150	Continuing	Continuing	-
Systems Dynetics Support	C/CPAF	Dynetics : Dayton, OH	-	0.100	Feb 2019	0.180	Feb 2020	0.180	Feb 2021	-		0.180	Continuing	Continuing	-
ECID MS&A	C/CPAF	TBD : TBD	-	0.124	Dec 2018	0.600	Dec 2019	0.600	Dec 2020	-		0.600	Continuing	Continuing	-
<b>Subtotal</b>			-	0.542		1.130		0.930		-		0.930	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	PO	Army : WSMR, NM	-	0.350	Sep 2019	-		-		-		-	Continuing	Continuing	-
Data Collection	PO	46th Test Wing : Eglin AFB, FL	-	0.000	Feb 2019	1.450	Mar 2020	1.411	Oct 2020	-		1.411	Continuing	Continuing	-
AP Hill	C/CPAF	AP Hill : Ft AP Hill, VA	-	0.023	Feb 2019	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.373		1.450		1.411		-		1.411	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
AFRL PMA	Various	Various : Various, OH	-	0.115	Mar 2019	1.928	Mar 2020	1.995		-		1.995	Continuing	Continuing	-
Systems Engineering Program Management (AIMSPO)-Mode 5 Level 2 B Cooperative	MIPR	DMEA : McClellan, CA	-	-		-		-		-		-	Continuing	Continuing	-
System Engineering Program Management (AIMSPO) Cooperative	MIPR	DTIC : Robins AFB, GA	-	2.535	Feb 2019	-		-		-		-	Continuing	Continuing	-
Program Office Support Cooperative	Various	Various : Various	-	0.180	Oct 2018	-		-		-		-	Continuing	Continuing	-
Program Office Support DOD AIMS Process System (DAPS) data base Cooperative	MIPR	78ABW : Robins AFB, FM	-	0.000	Jun 2019	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	2.830		1.928		1.995		-		1.995	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Air Force</b>								<b>Date:</b> February 2020					
<b>Appropriation/Budget Activity</b> 3600 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>				<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>					
	<b>Prior Years</b>	<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	-	17.561		24.545		22.124		-		22.124	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Combat Identification Technology</b>	
LASER VISION - VAMP	[Redacted]
LASER VISION - VAMP Lab Demo	[Redacted]
LASER VISION - VAMP POD Demo	[Redacted]
LASER VISION - 3D Ladar (3DTO)	[Redacted]
LASER VISION - 3D Ladar (3DTO) Lab Demo	[Redacted]
LASER VISION - 3D Ladar (3DTO) POD Demo	[Redacted]
Hydra Vision/FJORD - Air to Air (2 & 3 Features) (TRL-6 begins 3Qt FY18)	[Redacted]
Hydra Vision - Air to Air 2 Feature RT Demo	[Redacted]
Hydra Vision - Air to Air 3 Feature RT Demo	[Redacted]
Compact AiTR - Compact Feature AiTR	[Redacted]
Compact AiTR - Compact Feature LiDAR AiTR Lab Demo (May 2017)	[Redacted]
Compact AiTR- Compact Feature AiTR - Flight Demo (Jul 2017)	[Redacted]
Passive RF ID (PRIDE)	[Redacted]
Passive RF ID (PRIDE) - Lab Demo (Jun 20)	[Redacted]
Passive RF ID (PRIDE) - OPS Demo (Dec 2022)	[Redacted]
Radio ID (RID)/Integrated CID w/Electronic Warfare (ICE)	[Redacted]
Radio ID - Lab Demo #1 (Jul 2019)	[Redacted]
Radio ID - Lab Demo #2 (Jan 2021)	[Redacted]

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Radio ID -Flight Demo (Aug 2022)	█
Kill Chain Weapons Integration (KWIC)	
Studies	
Enhanced CID (ECID)	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Combat Identification Technology</i></b>				
LASER VISION - VAMP	1	2019	2	2023
LASER VISION - VAMP Lab Demo	4	2019	4	2019
LASER VISION - VAMP POD Demo	3	2021	3	2021
LASER VISION - 3D Ladar (3DTO)	1	2019	2	2020
LASER VISION - 3D Ladar (3DTO) Lab Demo	2	2019	2	2019
LASER VISION - 3D Ladar (3DTO) POD Demo	4	2019	4	2019
Hydra Vision/FJORD - Air to Air (2 & 3 Features) (TRL-6 begins 3Qt FY18)	1	2019	4	2024
Hydra Vision - Air to Air 2 Feature RT Demo	4	2019	4	2022
Hydra Vision - Air to Air 3 Feature RT Demo	4	2020	4	2020
Compact AiTR - Compact Feature AiTR	1	2019	4	2022
Compact AiTR - Compact Feature LiDAR AiTR Lab Demo (May 2017)	3	2019	3	2019
Compact AiTR- Compact Feature AiTR - Flight Demo (Jul 2017)	4	2019	4	2019
Passive RF ID (PRIDE)	4	2019	2	2024
Passive RF ID (PRIDE) - Lab Demo (Jun 20)	3	2020	3	2021
Passive RF ID (PRIDE) - OPS Demo (Dec 2022)	1	2023	1	2023
Radio ID (RID)/Integrated CID w/Electronic Warfare (ICE)	2	2019	2	2025
Radio ID - Lab Demo #1 (Jul 2019)	4	2019	4	2019
Radio ID - Lab Demo #2 (Jan 2021)	2	2021	2	2021
Radio ID -Flight Demo (Aug 2022)	3	2022	3	2022
Kill Chain Weapons Integration (KWIC)	1	2020	4	2025
Studies	1	2019	4	2025

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force			<b>Date:</b> February 2020	
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642597 / <i>Noncooperative Identification Subsystems</i>		

<b>Events by Sub Project</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
Enhanced CID (ECID)	1	2019	1	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>				<b>Project (Number/Name)</b> 642599 / <i>Cooperative Identification Techniques</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
642599: <i>Cooperative Identification Techniques</i>	-	0.000	2.040	2.076	0.000	2.076	2.082	2.119	2.156	2.197	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Cooperative Combat Identification (CID) employs technologies required to rapidly identify friendly platforms. The program develops, integrates and evaluates technologies that provide AF platforms with a means of positively identifying an air or ground platform as a friendly, via active or passive cooperative identification capabilities. The development funded by this project ensures availability of a Mode 5 upgrade path for implementing ground and air platforms across the Air Force fleet. The DoD International AIMS PO has system level interoperability testing and certification responsibilities for the present Mark XII system, development and integration of the new Mark XIIA (Mode 5) IFF system, and development/integration of civil Mode S capabilities into Mark XIIA IFF equipment. The AIMS PO ensures IFF equipment equipment/platform functionality IAW established standards and ensures total system interoperability to meet DoD/Service mission areas (e.g. Offensive Counter Air, Defensive Counter Air, and Integrated Air and Missile Defense). DoD International AIMS PO will continue to test and certify IFF equipment for the Services for as long as IFF is used for CID.

In FY21 our cooperative goals will be to test and certify the responsibilities for the present Mark XII system, develop and integrate the new Mark XIIA (Mode 5) IFF system, and also the development/integration of civil Mode S capabilities into Mark XIIA IFF equipment. The cooperative funds will be used to fund project and test engineers who will develop and test standards, perform certification testing in the field, process certifications and track all OSD/FAA guidelines to insure the program remains current. The OSD/FAA guidelines require Mode 5 be fully implemented by 2020 and the AIMS Program will insure those certifications are current on all applicable platforms/systems and work with both domestic and foreign military sales partners to insure compliance. The funds also support DOD representation to several military (US and NATO) and civil (FAA, ICAO and RTCA) requirements meetings for Mode 5, Mode S and ADS-B.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Air Traffic Control and Radar Beacon Systems Identification Friend or Foe Mark XIIA System (AIMS) Program Office	0.000	2.040	2.076	0.000	2.076
<b>Description:</b> Develop and maintain technical standards on development, integration, testing, and certification of DoD IFF (Identification Friend or Foe) equipment. Coordinate and execute equipment/subsystem-level certifications and platform certifications of IFF capabilities (132 platform certifications were completed in FY19). Support Foreign Military Sales of U.S. IFF equipment. Currently managing 29 active FMS Cases. Support NATO IFF Capabilities Team (Mode 5 IFF is a NATO waveform). Support International Civil Aviation Organization (ICAO) Technical Support Group (develops standards for world-wide civil Air Traffic Control).					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642599 / <i>Cooperative Identification Techniques</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Create and maintain civil Mode S address assignments and military Mode 5 Platform ID Number (PIN) assignments for every DoD platform using these waveforms in their interrogator and/or transponder equipment.					
<b><i>FY 2020 Plans:</i></b> Continuing to fund AIMS for interoperability IFF testing (civil and military), FAA liaison, to support of Mode 4 / Mode 5 equipment, updating and developing IFF standards.					
<b><i>FY 2021 Base Plans:</i></b> - Will continue to fund AIMS for interoperability IFF testing (civil and military), FAA liaison, to support of Mode 4 / Mode 5 equipment, updating and developing IFF standards.					
<b><i>FY 2021 OCO Plans:</i></b> N/A					
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> FY20 to FY21 increase of \$.036M funds the annual standard increase in rates for contract costs.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	2.040	2.076	0.000	2.076

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 04 0603742F: <i>Combat Identification Technology</i>	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000

**Remarks**

**D. Acquisition Strategy**  
 Combat Identification develops technologies for exploitation by the USAF and the other services. Award multiple, competitive contract vehicles emphasizing off-the-shelf technology and maximizing the use of non-developmental items (NDIs). Management develops a technology to a point it can be demonstrated in a relative combat environment.







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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 642599 / <i>Cooperative Identification Techniques</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Cooperative Identification Techniques</i></b>				
AIMS Program Office Activities	1	2019	4	2025
AIMS Program Office Annual Workshop (April 2019)	3	2019	3	2019
AIMS Program Office Annual Workshop (Apr 2020)	3	2020	3	2020
AIMS Program Office Annual Workshop (Apr 2021)	3	2021	3	2021

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>				<b>Project (Number/Name)</b> 643420 / <i>Combat ID Database Development</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
643420: <i>Combat ID Database Development</i>	-	0.000	5.500	2.196	0.000	2.196	2.696	2.695	2.595	2.643	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Database Initiative (DBI) is a project, under the Combat Identification (CID) portfolio, designed to remove the "hard-coded" static ID parameters (typically updated every 4-5 years) from the host platform's sensor(s) and replace them with parameterized values that are easily and quickly updated when new intelligence inputs come available (this allows maximum flexibility to tailor each aircraft's CID database(s) based on assigned theater of operation, threat country of interest, and assigned mission tasks). The DBI project primarily consists of four efforts: a.) determining a sensor's requisite ID parameters for CID, b) designing and developing a database to contain the CID parameters identified in Task a, c) developing techniques to generate the requisite parameters, and d) provide CID parameters developed from measured or modeled data.

Due to the critical nature of this project (impacts every combat and many ISR platforms), DBI uses existing PE 63742F funds. The FY-21 effort will determine the requisite CID features for High Range Resolution (HRR) and Non Cooperative Target Recognition (NCTR) air to air modes; specify the requirements for initial CID database design for these radar modes; and collect initial sample data to populate the HRR and NCTR databases for developmental test/debug. Databases for other CID modalities will be added over time (e.g., air to air ground radar modes, 3-D LADAR, etc.)

The benefit of using Mission Definable parameters is that they are dynamically developed and can be added, edited, or removed by preflight Mission Planning software such as the Joint Mission Planning System (JMPS). Current CID parameters for existing techniques, e.g., NCTR, are being developed faster than host platform OFPs. This leads to implementation lags that often exceed as great as four years. By removing the "hard-coded" parameters from the sensors and enabling loading dynamic values via mission planning, the lag time could initially be reduced to months, and possibly even weeks or days.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Database Development	0.000	5.500	2.196	-	2.196
<b>Description:</b> The Database Initiative (DBI) is a project, under the Combat Identification (CID) portfolio, designed to remove the "hard-coded" static ID parameters from the host platform's sensor and replace them with parameterized values that are dynamic.					
<b>FY 2020 Plans:</b> This project begins in early FY20 (no funds have been required/requested previously). -determine the requisite CID features for HRR and NCTR					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 643420 / <i>Combat ID Database Development</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
-specify the requirements for initial database design -collect initial sample data to populate the database for developmental test/debug -develop a device to load time through DS-101 and other interfaces  <b>FY 2021 Base Plans:</b> - will determine the requisite CID features for HRR and NCTR air-to-air radar modes - will specify the requirements for initial CID database design for these radar modes - collect initial sample data to populate the HRR and NCTR databases for developmental test/debug  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The DBI effort will decrease activity identified as timing device effort comes to completion.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	5.500	2.196	-	2.196

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTE 04 0603742F: <i>Combat Identification Technology</i>	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000

**Remarks**

**D. Acquisition Strategy**

Combat Identification develops technologies for exploitation by the USAF and the other services. Award multiple, competitive contract vehicles emphasizing off-the-shelf technology and maximizing the use of non-developmental items (NDIs). Management develops a technology to a point it can be demonstrated in a relative combat environment.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 643420 / <i>Combat ID Database Development</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Combat ID Database Development</b>	
Combat ID Database Development	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603742F / <i>Combat Identification Technology</i>	<b>Project (Number/Name)</b> 643420 / <i>Combat ID Database Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Combat ID Database Development</i></b>				
Combat ID Database Development	3	2020	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603790F / NATO Research and Development
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	2.221	4.955	3.647	0.000	3.647	4.141	4.215	4.290	4.368	0.000	27.837
64NATO: <i>Nato Coop R&amp;D</i>	-	2.221	4.955	3.647	0.000	3.647	4.141	4.215	4.290	4.368	0.000	27.837
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Note**

In FY 2016, PE 0603791F, International Space Cooperative Research & Development, Project 645035, International Space Coop R&D, efforts were transferred to PE 0603790F, NATO Research and Development, Project 64NATO, NATO Coop R&D, in order to consolidate international cooperative research and development activities.

**A. Mission Description and Budget Item Justification**

These funds will be used to initiate air, space, and cyber international cooperative research, and development (ICR&D) agreements with North Atlantic Treaty Organization (NATO) member states, major non-NATO allies and friendly foreign countries. Each of the selected activities and projects are required to have a concluded international agreement (IA), prior to funds being released, that implements the provisions of Title 10 U.S. Code, Section 2350a. This legislation (Title 10 U.S. Code, Section 2350) authorizes funds to significantly improve U.S. and allied conventional defense capabilities by leveraging the best defense technologies, eliminating costly duplication of R&D efforts, accelerating the availability of defense systems, and promoting US and allied interoperability or commonality. These funds will not be used for government civilian salaries, permanent construction, or spent overseas. This program element funds the implementation of Air Force ICR&D agreements in (1) Basic Research (2) Applied Research (3) Advanced Technology Development (4) Advanced Component Development and Prototypes (5) System Development and Demonstration and (6) RDT&E Management Support.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603790F / NATO Research and Development
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	2.305	4.955	4.701	0.000	4.701
Current President's Budget	2.221	4.955	3.647	0.000	3.647
Total Adjustments	-0.084	0.000	-1.054	0.000	-1.054
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.084	0.000	-1.054	0.000	-1.054

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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**Title:** International Cooperative Research and Development 2.221      4.955      3.647

**Description:** Supports bi- and multi-lateral international agreements that meet USAF RDT&E objectives and goals. Each of the cooperative projects that receive funding must meet one or more of the following requirements: enhance warfighter capabilities and coalition interoperability; accelerate the availability of defense systems; strengthen and reinforce strategic partnerships; gain access to the best defense technologies, capabilities and techniques; build relationships and influence with allies; and/or eliminate duplication of R&D efforts.

**FY 2020 Plans:**

FY20 cooperative projects involve RDT&E efforts in Autonomy, human performance, information systems, aerospace systems, munitions, materials and manufacturing, sensors, space situational awareness, missile warning, military satellite communications, global positioning systems, responsive space capabilities, cyber network defense and information assurance, and space vehicles. These projects include but are not limited to: Autonomous Fighter Risk Reduction; 5th Generation Ground Collision System Avoidance; Hypersonic ceramic composite; Protected Tactical Enterprise; Military Optical Communications and Optical Space Data Relay (MOSCOM)Support; NEMISIS-UAS surveillance; Deep Strike Weapon Systems THRESHER 1 and 2; Biological inspired technologies integrated on UAS platforms; Cyber Space-Building Trusted Networks and Resilient Systems, Space Situational Awareness; Impact Damage and Fire Effects; Spectral-aided tagging, tracking, and locating (SATTL); Autonomous Situational Awareness Technology; and Protected Tactical Field System Demo (PTFSD). These projects involved interoperability in cooperative R&D ventures with these Allies, Major Non-NATO Allies and Strategic Partners: Australia, France, Germany, Republic of Korea, Japan, Norway, United Kingdom, Canada, Spain, Singapore, and Sweden.



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603790F / NATO Research and Development
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A			
<p><b>FY 2021 Plans:</b>                      FY21 cooperative projects involve RDT&amp;E efforts in Artificial Intelligence, directed energy, hypersonics, Autonomy, human performance, information systems, aerospace systems, munitions, materials and manufacturing, sensors, space situational awareness, missile warning, military satellite communications, global positioning systems, responsive space capabilities, cyber network defense and information assurance, and space vehicles. These projects include but are not limited to: Development of Emerging Additive Manufacturing Technologies (DAWN); Mission Planning for Photonic Systems; Micro-Satellite Military Utility (MSMU) Ground Station Interoperability; Improved Technology for High-temperature Alloys Necessary to Optimize Small Supersonic Systems (I-THANOS3); Himalayan Eagle; Ignition Optimization Using Pulsed Discharge; Selected Cyber Information Exchange; Next Generation EO IR Sensor Technology (NGIEST); Solid State High Power Microwave ‘Cannon’; HPM Target Effects &amp; Weaponization; Deep Space Radar; Confined Quantum Sensors; Embedded Flow Control for Low Pressure Turbines (LPTs); Sensors &amp; PID (Positive threat Identification) Enhanced Model for Directed Energy; Hybrid Ultra-Wide/Narrow Band Directed Energy Weapon (DEW); Quantum Sensors for Ephemeris-Free Space Operations; Improved HPEM Elements for Next Generation RF-Directed Energy Weapons; and Intelligent Adaptive Collaborative Teaming Technologies (IACTT). These projects involved interoperability in cooperative R&amp;D ventures with these Allies, Major Non-NATO Allies and Strategic Partners: Australia, Estonia, Israel, Germany, Canada, United Kingdom, Italy, Netherlands, Norway, New Zealand, India, Republic of Korea, Japan, and Singapore.</p>			
N/A			
<p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>                      NATO Coop R&amp;D experienced a decrease between FY20 and FY21 of \$1.348 which will be the new baseline for future years.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	2.221	4.955	3.647

**D. Other Program Funding Summary (\$ in Millions)**  
 N/A

**Remarks**

**E. Acquisition Strategy**  
 A principal goal of the NATO Cooperative R&D program is to effectively utilize the aggregate resources invested by the US and our allies in air, space, and cyber R&D. This program element provides the critical funding incentive needed to pursue air, space and cyber related International Cooperative Research Development and Acquisition (ICRD&A) agreements and helps to (a) leverage USAF and allied resources through cost sharing and economies of scale; (b) exploit the best US

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	PE 0603790F / <i>NATO Research and Development</i>

and allied technologies for equipping coalition forces; (c) demonstrate areas of commonality or interoperability with our allies; and (d) accelerate the availability of defense technology and systems. Candidate projects are reviewed against USAF goals, DoD objectives, and warfighter needs prior to being approved. An international agreement defining project objectives, responsibilities and costs is required prior to release of funds. To obtain these funds and ensure service commitment, projects are selected from existing or new RDT&E programs funded in the Future Years Defense Plan (FYDP). Project offices must show matching funds and contributions from associated program elements and equitable allied funding. As appropriate, funding responsibility for out-year requirements and follow-on efforts are transferred to the project office and associated program elements. Any new contracts are awarded after full and open competition.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790F / NATO Research and Development	<b>Project (Number/Name)</b> 64NATO / Nato Coop R&D

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>NATO Coop R&amp;D</b>																												
FY21 ICR&D Projects - Call Letter	████████																											
FY21 ICR&D Projects - nomination package development	████████																											
FY21 ICR&D Projects - Review panel	████																											
FY21 ICR&D Projects - Coordination of review panel results	████																											
FY21 ICR&D Approved Project Letter to the MAJCOMs	████																											
FY21 ICR&D Projects - Agreement development, negotiations, and signature	██																											
FY21 ICR&D Projects - RDTE cooperative project work	██																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790F / NATO Research and Development	<b>Project (Number/Name)</b> 64NATO / Nato Coop R&D

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>NATO Coop R&amp;D</b>				
FY21 ICR&D Projects - Call Letter	2	2019	3	2019
FY21 ICR&D Projects - nomination package development	2	2019	3	2019
FY21 ICR&D Projects - Review panel	3	2019	3	2019
FY21 ICR&D Projects - Coordination of review panel results	4	2019	4	2019
FY21 ICR&D Approved Project Letter to the MAJCOMs	4	2019	4	2019
FY21 ICR&D Projects - Agreement development, negotiations, and signature	1	2020	2	2021
FY21 ICR&D Projects - RDTE cooperative project work	1	2020	2	2021

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	24.994	30.969	32.959	0.000	32.959	55.370	56.088	7.358	7.493	Continuing	Continuing
641020: <i>ICBM Guidance Applications</i>	-	4.540	5.184	3.608	0.000	3.608	8.143	8.380	0.000	0.000	Continuing	Continuing
641021: <i>ICBM Propulsion Applications</i>	-	0.039	0.000	6.954	0.000	6.954	7.101	7.227	7.358	7.493	Continuing	Continuing
641022: <i>ICBM Reentry Vehicle Applications</i>	-	16.052	18.148	22.397	0.000	22.397	40.126	40.481	0.000	0.000	Continuing	Continuing
641024: <i>ICBM Command &amp; Control (C2) Applications</i>	-	0.608	3.713	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
644209: <i>Long Range Planning (LRP)</i>	-	3.755	3.924	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

This program ensures a responsive design and development engineering infrastructure to address emerging issues and technology insertion/technology application on legacy Intercontinental Ballistic Missile (ICBM), future strategic systems/capability beyond the Ground Based Strategic Deterrent (GBSD) baseline, and other common strategic deterrent mission areas to develop enhanced multi-use capabilities. The ICBM Dem/Val program will provide technology maturation and risk reduction activities to support Minuteman (MM) III sustainment, MM III to GBSD transition, and future ICBM systems development. ICBM Dem/Val conducts advanced component development and prototyping to validate emerging strategic missile technologies and future upgrades to the baseline Ground Based Strategic Deterrent, currently in development through a low risk, technologically-mature acquisition strategy. Efforts will identify methods to improve system performance, develop potential future RV designs, mitigate evolving threats, reduce life cycle costs, develop/expand modeling/simulation and experimental platforms for weapon qualification activities, improve nuclear safety and surety, and ensure both viability and durability of strategic missile systems.

The ICBM Dem/Val program will develop key enabling engineering tools for the ICBM mission to include MBSE, test software and modernization of existing analytical tools. This program will leverage existing modular system architecture and continue the maturation of modular system architecture and agile software development.

After ramping down to avoid duplication of effort with GBSD between FY16-18, ICBM Dem/Val began expanding efforts again in FY19. The majority of effort in FY21 is in RVAP to continue work in the Air Force development of the W87-R and Advanced Concept Studies.

The FY 2021 funding request was reduced by \$21.603 million to account for the availability of prior year execution balances.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver ICBM Dem/Val capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F or 0605833F.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	32.356	44.109	65.582	0.000	65.582
Current President's Budget	24.994	30.969	32.959	0.000	32.959
Total Adjustments	-7.362	-13.140	-32.623	0.000	-32.623
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-13.140			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-6.248	0.000			
• SBIR/STTR Transfer	-1.114	0.000			
• Other Adjustments	0.000	0.000	-32.623	0.000	-32.623

**Change Summary Explanation**

FY2019 funding reflects a \$6.248 million below threshold reprogramming and a \$1.114 million reduction for Small Business Innovation Research.  
 FY2020 funding reflects a Congressional directed reduction of \$13.140 million for "Excess to need."  
 FY2021 funding reduced to address higher Air Force issues



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>				<b>Project (Number/Name)</b> 641020 / <i>ICBM Guidance Applications</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
641020: <i>ICBM Guidance Applications</i>	-	4.540	5.184	3.608	0.000	3.608	8.143	8.380	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Guidance Applications Program (GAP) ensures the development of strategic capability in response to the Nuclear Posture Review, recommendations of the United States Strategic Command (USSTRATCOM) Strategic Advisory Group, USSTRATCOM Commander Guidance, and the Defense Science Board Task Force on Nuclear Deterrence. The program studies and assesses both legacy and future (non-GBSD baseline) ICBM Guidance System technology applications. Efforts are focused on current and future requirements and technologies, reduced life cycle costs, and increased nuclear surety and safety. Activities leverage the efforts of the Science and Technology community and are coordinated with the Navy strategic applications program to enhance synergy and avoid duplication. Key elements include developing responsive technologies with common applications for future strategic guidance capabilities. This program also includes any needed nuclear surety and certification and system vulnerability assessments.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Guidance Applications Program	4.540	5.184	3.608
<b>Description:</b> Develop and mature advanced technologies and concepts to support future requirements.			
<b>FY 2020 Plans:</b>			
<ul style="list-style-type: none"> <li>• Continue the evaluation and testing of strategic and space guidance-related commodities within market for potential use in a future (non-GBSD baseline) strategic guidance system; coordinate with the Navy strategic applications program.</li> <li>• Continue development of a Micro-Electro Mechanical System for potential insertion into the Path Length Module.</li> <li>• Continue expanding the Strategic Guidance Hardware independent validation &amp; verification capability to include multi-G force environment and other various environments; perform Guidance analyses and Guidance technology studies.</li> <li>• Continue evaluating emerging strategic instrument technologies for future strategic grade gyros and accelerometers to ensure appropriate test capability development.</li> <li>• Rapidly respond to evolving warfighter priorities and emerging requirements.</li> </ul>			
<b>FY 2021 Plans:</b>			
<ul style="list-style-type: none"> <li>• Continue the evaluation and testing of strategic and space guidance-related commodities within market for potential use in a future (non-GBSD baseline) strategic guidance system; coordinate with the Navy strategic applications program.</li> <li>• Continue development of a Micro-Electro Mechanical System for potential insertion into the Path Length Module.</li> <li>• Continue expanding the Strategic Guidance Hardware independent validation &amp; verification capability to include multi-G force environment and other various environments; perform Guidance analyses and Guidance technology studies.</li> </ul>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 641020 / <i>ICBM Guidance Applications</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>• Continue evaluating emerging strategic instrument technologies for future strategic grade gyros and accelerometers to ensure appropriate test capability development, to include gyrometer and nested IMU development.</li> <li>• Rapidly respond to evolving warfighter priorities and emerging requirements.</li> </ul> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Funding decreased consistent with planned activities for this project.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	4.540	5.184	3.608

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 PE 0605230F: <i>GBSD</i>	401.244	557.495	1,524.759	-	1,524.759	2,536.450	3,034.370	3,072.837	3,031.610	7,327.795	21,486.560

**Remarks**

**D. Acquisition Strategy**

Accomplish studies, analyses, concept development and engineering; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved. Current effort deliverables to include strategic grade guidance prototypes to support multiple ongoing Air Force initiatives.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 641020 / <i>ICBM Guidance Applications</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>GAP</b>																												
GAP Micro-Electronic Module System																												
GAP Emerging Strategic Instrument Technology Requirements																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 641020 / <i>ICBM Guidance Applications</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>GAP</b>				
GAP Micro-Electronic Module System	2	2019	4	2022
GAP Emerging Strategic Instrument Technology Requirements	2	2019	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>				<b>Project (Number/Name)</b> 641021 / <i>ICBM Propulsion Applications</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
641021: <i>ICBM Propulsion Applications</i>	-	0.039	0.000	6.954	0.000	6.954	7.101	7.227	7.358	7.493	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Propulsion Applications Program (PAP) develops and assesses strategic propulsion system technology applications for both legacy and future (non-GBSD baseline) systems through projects exploring improvements and/or alternatives to current propulsion systems, conducting studies assessing application of new technologies to meet future common propulsion systems requirements, and assessing opportunities for applying common materials and technology between the ICBM, submarine-launched ballistic missile (SLBM) propulsion systems, and other rocket motor propulsion capabilities. Efforts are focused on current and future requirements and technologies, reduced life cycle costs, and increased nuclear surety, safety, certification and system vulnerability assessments.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Propulsion Applications Program	0.039	0.000	6.954
<b>Description:</b> Assess, develop, evaluate, and demonstrate common solid and liquid propulsion technology and manufacturing leading up to a static fire and test of strategic propulsion systems; develop capability and explore improvements to current and future propulsion systems; and support the research and development industrial base and critical infrastructure.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> <ul style="list-style-type: none"> <li>• Initiate propellant studies to develop alternative propulsion systems for future ICBM program insertion.</li> <li>• Initiate propulsion system studies to develop low-toxic propellant formulations for future ICBM program insertion.</li> <li>• Continue to monitor emerging technologies to rapidly respond to warfighter priorities and emerging requirements.</li> </ul>			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased consistent with planned activities for this project including initiation of low-toxic propellant development and alternate propulsion system development for post-boost vehicle.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.039	0.000	6.954

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 641021 / <i>ICBM Propulsion Applications</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 PE 0605230F: <i>GBSD</i>	401.244	557.495	1,524.759	-	1,524.759	2,536.450	3,034.370	3,072.837	3,031.610	7,327.750	21,486.515

**Remarks**

**D. Acquisition Strategy**

Studies, analyses, limited engineering, hardware development and/or testing will be accomplished; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved. Current effort deliverables include alternate propulsion technology prototypes and low toxic hazard propellants that can be utilized in a variety of Air Force applications.





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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 641021 / <i>ICBM Propulsion Applications</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>PAP</b>	
PAP Post Boost Propellant Studies	
PAP Alternate Propulsion Systems/Low Toxic Propellant Studies	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 641021 / <i>ICBM Propulsion Applications</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>PAP</b>				
PAP Post Boost Propellant Studies	2	2021	4	2024
PAP Alternate Propulsion Systems/Low Toxic Propellant Studies	2	2021	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>				<b>Project (Number/Name)</b> 641022 / <i>ICBM Reentry Vehicle Applications</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
641022: <i>ICBM Reentry Vehicle Applications</i>	-	16.052	18.148	22.397	0.000	22.397	40.126	40.481	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Reentry Vehicle Applications Program (RVAP) ensures the ICBM force is equipped with the safest, most reliable, most survivable Reentry Systems, and explores options for common, multi-mission capabilities. The program enables a responsive engineering infrastructure by developing modeling/simulation and ground and flight test platforms to support Reentry System qualifications. The program ensures the availability of long-lead components and materials while identifying life cycle cost reduction methods. In addition, the program matures and tests advanced Reentry System technologies and designs to meet future requirements. This includes studying and assessing technology applications relevant to Mk12A, Mk21, Mk21A and future ICBM Reentry Systems. The program leverages investments by the Science & Technology community and Navy reentry systems applications program. Testing may occur on a space available basis on Air Force and Navy Force Development Evaluation (FDE) flights.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Reentry Vehicle Applications Program	16.052	18.148	22.397
<b>Description:</b> Mature, evaluate, and test reentry system materials, technologies, and vehicles including modeling/simulation, and ground and flight test platforms for use in current and future strategic applications.			
<b>FY 2020 Plans:</b>			
<ul style="list-style-type: none"> <li>• Continue and initiate new risk reduction studies for RV nosetips to mature and evaluate future heatshield development, carbon phenolic replacements, modeling and simulation programs, manufacturing capabilities, reentry system technologies, threat development analysis and countermeasure technologies/strategies, and inform future RV capabilities.</li> <li>• Conduct materials development, prototyping, and test.</li> <li>• Develop new modeling/simulation and flight test platforms for future weapon qualification activities.</li> <li>• Continue supporting the Joint Technology Demonstrator.</li> <li>• Continue supporting the Air Force and NNSA Demonstrator Initiative and facilitate transition to Mk21A Reentry Vehicle program.</li> <li>• Continue study for future RV concepts.</li> <li>• Continue materials test platform on orbital vehicle.</li> <li>• Continue aeroshell modification and development studies.</li> <li>• Rapidly respond to evolving warfighter priorities and emerging requirements.</li> </ul>			
<b>FY 2021 Plans:</b>			
<ul style="list-style-type: none"> <li>• Conduct materials development, prototyping, and test.</li> </ul>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 641022 / <i>ICBM Reentry Vehicle Applications</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>• Develop new modeling/simulation and flight test platforms for future weapon qualification activities.</li> <li>• Continue study for future RV concepts.</li> <li>• Continue materials test platform on orbital vehicle.</li> <li>• Rapidly respond to evolving warfighter priorities and emerging requirements.</li> <li>• Develop designs and production concepts for trusted radiation-hardened advanced microelectronics.</li> <li>• Continue design of Virtual Instructor Prototype for ICBM Platforms.</li> <li>• Design predictive health management tool based on engineering predictive analysis.</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased consistent with planned activities for this project, including Virtual Instructor Prototype and Radiation-Hardened Advanced Microelectronics transitioned from Long Range Planning (Project 644209).</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	16.052	18.148	22.397

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 04 0605230F: <i>Ground Based Strategic Deterrent</i>	401.244	557.495	1,524.759	0.000	1,524.759	2,536.450	3,034.370	3,072.837	3,031.610	7,327.795	21,486.560
• RDTE 07 0101328F: <i>ICBM Reentry Vehicles</i>	13.747	65.671	112.753	0.000	112.753	74.755	81.756	225.602	252.142	2,193.374	3,019.800

**Remarks**

**D. Acquisition Strategy**

Studies, analyses, limited engineering, and pre-prototype hardware development will be accomplished; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved. Current effort deliverables include various technologies for ICBM re-entry vehicles including nosetip materials, modeling and simulation software, alternate high temperature materials, and methodologies for modifying aeroshells.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 641022 / <i>ICBM Reentry Vehicle Applications</i>
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
RVAP Support	C/FFP	BAE Systems : Clearfield, UT	-	1.283	Mar 2019	1.000	Mar 2020	1.800	Mar 2021	-		1.800	Continuing	Continuing	-
RVAP Study Support	C/FFP	Aerospace : TBD	-	-		-		0.850	Jan 2021	-		0.850	Continuing	Continuing	-
<b>Subtotal</b>			-	1.283		1.000		2.650		-		2.650	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
RVAP Joint Technology Demonstrator	MIPR	SNL and LLNL : Various	-	3.664	Jan 2019	1.663	Jan 2020	-		-		-	Continuing	Continuing	-
RVAP Flight Materials Test Platform	MIPR	SAF/FMBIB : Various	-	0.500	Jul 2019	0.500	Jul 2020	0.800	Jul 2021	-		0.800	Continuing	Continuing	-
RVAP Modeling and Simulation Programs	Various	Various : Various	-	0.000		0.460	Feb 2020	1.800	Feb 2021	-		1.800	Continuing	Continuing	-
RVAP Nosetip Studies	Various	Various : Various	-	1.060	Apr 2019	4.605	Apr 2020	-		-		-	Continuing	Continuing	-
RVAP Advanced Concept Studies	Various	Various : Various	-	0.683	Jan 2019	5.365	Dec 2019	5.100	Jan 2021	-		5.100	Continuing	Continuing	-
RVAP Air Force and NNSA Demonstrator Initiative	MIPR	SNL and LLNL : Various	-	1.366	Jan 2019	0.000	Jan 2020	-		-		-	0.000	1.366	-
RVAP Aeroshell Studies	Various	Various : Various	-	1.925	Jan 2019	1.535	Jan 2020	-		-		-	Continuing	Continuing	-
RVAP Sensors Studies	Various	Various : Various	-	0.208	Jan 2019	0.588	Jan 2020	-		-		-	Continuing	Continuing	-
RVAP Virtual Instructor Prototype	C/CPFF	Johns Hopkins-A PL: : Laurel, MD	-	-		-		2.200	Apr 2021	-		2.200	Continuing	Continuing	-
RVAP Radiation-Hardened Advanced Microelectronics	Various	Various : Various	-	-		1.907	Feb 2020	9.085	Jan 2021	-		9.085	Continuing	Continuing	-
<b>Subtotal</b>			-	9.406		16.623		18.985		-		18.985	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Air Force</b>											<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>				<b>Project (Number/Name)</b> 641022 / <i>ICBM Reentry Vehicle Applications</i>					

<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
RVAP Program Management Administration	Various	Various : Various	-	5.363	Jan 2019	0.525	Jan 2020	0.762	Jan 2021	-		0.762	Continuing	Continuing	-
<b>Subtotal</b>			-	5.363		0.525		0.762		-		0.762	Continuing	Continuing	N/A

			<b>Prior Years</b>	<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>			-	16.052		18.148		22.397		-		22.397	Continuing	Continuing	N/A

**Remarks**  
 Due to limited funding in FY19, some requirements were deferred to FY20 and FY21 causing a dramatic ramp-up in FY20 and FY21 efforts.



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 641022 / <i>ICBM Reentry Vehicle Applications</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>RVAP</b>				
Propulsion and Rocket Motor Studies	2	2019	4	2019
RVAP Joint Technology Demonstrator	2	2019	4	2020
RVAP TPS Testing and Analysis	1	2019	2	2019
RVAP Flight Materials Test Platform	4	2019	4	2022
RVAP Modeling and Simulation Programs	2	2019	4	2023
RVAP Nosetip Studies	3	2019	4	2020
RVAP Advanced Concept Studies	1	2019	2	2023
RVAP Air Force and NNSA Demonstrator Initiative	2	2019	3	2020
RVAP Aeroshell Studies	1	2019	2	2020
RVAP Sensors Studies	2	2019	2	2019
RVAP VIPr LF Prototype Development	2	2021	1	2022
RVAP Radiation-Hardened Advanced Microelectronics	2	2020	4	2025



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>			<b>Project (Number/Name)</b> 641024 / <i>ICBM Command &amp; Control (C2) Applications</i>				
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
641024: <i>ICBM Command &amp; Control (C2) Applications</i>	-	0.608	3.713	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Command and Control Applications Program (C2AP) supports ICBM weapon system connectivity to the President and National Command Authorities. C2AP studies and assesses both legacy and future (non-GBSD baseline) C2 System technology applications. C2AP evaluates and develops assured, survivable, and secure communications and battlespace awareness between the missile Launch Control Centers and Launch Facilities essential for mission execution. Efforts include identifying and developing current and future technologies, as well as concepts that exploit state-of-the-art communications and information transfer techniques to both current and future ICBM systems. Products include studies, demonstrations and tests such as ICBM Weapon System C2 (WSC2) architectures, networks, and systems to meet nuclear command and control requirements.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Command and Control Application Program	0.608	3.713	0.000
<b>Description:</b> Examine and develop concepts for transforming ICBM WSC2 to meet current and future requirements.			
<b>FY 2020 Plans:</b>			
• Initiate cyber studies of technologies to improve weapon system command and control systems management.			
• Continue Battlespace Awareness studies.			
• Rapidly respond to evolving warfighter priorities and emerging requirements.			
<b>FY 2021 Plans:</b>			
N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			
Funding decreased consistent with planned activities for this project.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.608	3.713	0.000

**C. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 04 PE 0605230F: <i>GBSD</i>	401.244	557.495	1,524.759	-	1,524.759	2,536.450	3,034.370	3,072.837	3,031.610	7,327.795	21,486.560

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 641024 / <i>ICBM Command &amp; Control (C2) Applications</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**Remarks**

**D. Acquisition Strategy**

Studies, analyses, limited engineering, will be accomplished; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved. Current effort deliverables to include electronic technical order prototype and validation of a Navy-developed system for ICBM battlespace awareness needs.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 641024 / <i>ICBM Command &amp; Control (C2) Applications</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>C2AP</b>																												
C2AP Electronic Technical Orders	██████████																											
C2AP Battlespace Awareness Studies	██																											
C2AP Cyber Technologies					██████████																							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 641024 / <i>ICBM Command &amp; Control (C2) Applications</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>C2AP</b>				
C2AP Electronic Technical Orders	1	2019	3	2019
C2AP Battlespace Awareness Studies	1	2019	4	2020
C2AP Cyber Technologies	2	2020	4	2020

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>			<b>Project (Number/Name)</b> 644209 / <i>Long Range Planning (LRP)</i>				
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
644209: <i>Long Range Planning (LRP)</i>	-	3.755	3.924	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Long Range Planning (LRP) effort identifies and analyzes potential modifications to current and future Intercontinental Ballistic Missile (ICBM) Weapon Systems required to meet objectives relative to long-term sustainment, technology insertion, battle space awareness, employment, force structure and future systems. The studies will focus on system supportability, operability, reliability, innovation and maintainability. Options/concepts generated by these studies are evaluated for feasibility, system impacts, and cost. The LRP also lays the groundwork for analysis supporting future weapon systems development and deployment. Pre-milestone activities may be conducted for current or future ICBM weapon systems to include entry criteria for milestone activities.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Long Range Planning	3.755	3.924	0.000
<b>Description:</b> Analyze, study and plan current and future ICBM activities to meet requirements for long-term sustainment, technology insertion, employment force structure and future systems.			
<b>FY 2020 Plans:</b>			
<ul style="list-style-type: none"> <li>• Continue to develop designs and production concepts for trusted strategic radiation-hardened advanced microelectronics, and transfer to Reentry Vehicle Applications.</li> <li>• Continue Virtual Instructor Prototype for ICBM Platforms, and transfer to Reentry Vehicle Applications.</li> <li>• Rapidly respond to evolving warfighter priorities and emerging requirements.</li> </ul>			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased consistent with planned activities for this project, including transition of Virtual Instructor Prototype and Radiation-Hardened Advanced Microelectronics transitioned to Reentry Vehicle Applications (Project 641022).			
<b>Accomplishments/Planned Programs Subtotals</b>	3.755	3.924	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 644209 / <i>Long Range Planning (LRP)</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 PE 0605230F: <i>GBSD</i>	401.244	557.495	1,524.759	-	1,524.759	2,536.450	3,034.370	3,072.837	3,031.610	7,327.795	21,486.560

**Remarks**

**D. Acquisition Strategy**

Analysis will be accomplished; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved.





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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 644209 / <i>Long Range Planning (LRP)</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>LRP</b>																												
LRP Sensor Array Detection Study																												
LRP VIPr Prototype Development																												
LRP Radiation-Hardened Advanced Microelectronics																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	<b>Project (Number/Name)</b> 644209 / <i>Long Range Planning (LRP)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>LRP</b>				
LRP Sensor Array Detection Study	1	2019	2	2019
LRP VIPr Prototype Development	3	2019	1	2020
LRP Radiation-Hardened Advanced Microelectronics	2	2019	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>					<b>R-1 Program Element (Number/Name)</b>							
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					PE 0603859F / <i>Pollution Prevention - Dem/Val</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	0.193	3.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
644852: <i>Pollution Prevention</i>	-	0.193	3.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This project funds R&D activities that demonstrate and prototype alternative weapon system manufacturing, remanufacturing, and maintenance materials and processes that reduce or eliminate hazardous chemicals, materials and waste streams through cost-effective programs and practices, while improving energy efficiency and reducing greenhouse gas emissions. Upon proof of the new process or materials, the resulting product can be transitioned to depot maintenance processes, which results in reduced maintenance costs, reduced depot flow time, and increases asset availability. Specifically, funds target pollution prevention technologies that reduce or eliminate chromium, cadmium, and nickel, as well as reduce or eliminate Hazardous Air Pollutants (HAPS), Volatile Organic Compounds (VOCs), and Class I and II Ozone Depleting Substances (ODS), global warmers and biochemical oxygen demand (BOD) and to increase the use of renewable and alternative fuels.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.200	0.000	0.000	0.000	0.000
Current President's Budget	0.193	3.000	0.000	0.000	0.000
Total Adjustments	-0.007	3.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.007	3.000	0.000	0.000	0.000

**Change Summary Explanation**

Congressional Add for aviation ground equipment.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> R&D Activites	0.193	3.000	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603859F / <i>Pollution Prevention - Dem/Val</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> R&amp;D activities that demonstrate and prototype alternative weapon system manufacturing, remanufacturing, and maintenance materials and processes that reduce or eliminate hazardous chemicals, materials and waste streams through cost-effective programs and practices, while improving energy efficiency and reducing greenhouse gas emissions.</p> <p><b>FY 2020 Plans:</b> R&amp;D activities that demonstrate and prototype alternative weapon system manufacturing, remanufacturing, and maintenance materials and processes that reduce or eliminate hazardous chemicals, materials and waste streams through cost-effective programs and practices, while improving energy efficiency and reducing greenhouse gas emissions.</p> <p><b>FY 2021 Plans:</b> Program ends in 2019</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Program Ends in 2019</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	0.193	3.000	0.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

Pollution Prevention activities are level of effort and use time and materials support contracts.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603859F / <i>Pollution Prevention - Dem/Val</i>	<b>Project (Number/Name)</b> 644852 / <i>Pollution Prevention</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Pollution Prevention</i></b>	
Requirements ID	
Potential Alternatives	
Test Plan	
Test Report	
Demonstration	
Final Report	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603859F / <i>Pollution Prevention - Dem/Val</i>	<b>Project (Number/Name)</b> 644852 / <i>Pollution Prevention</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Pollution Prevention</i></b>				
Requirements ID	1	2019	4	2019
Potential Alternatives	1	2019	4	2019
Test Plan	1	2019	4	2019
Test Report	1	2019	4	2019
Demonstration	1	2019	4	2019
Final Report	1	2019	4	2019

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604002F / <i>Air Force Weather Services Research</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.772	0.869	0.000	0.869	1.000	0.803	0.831	0.846	0.000	5.121
643560: <i>AF Weather Services Research</i>	-	0.000	0.772	0.869	0.000	0.869	1.000	0.803	0.831	0.846	0.000	5.121
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Note**  
In FY2020, a portion of PE 0305111F, Weather Services, Project 672738 efforts were transferred to PE 0604002F, Air Force Weather Services Research, Project 643560 in order to properly align Advanced Component Development and Prototype activities with the correct funding source.

**A. Mission Description and Budget Item Justification**

This budget activity funds development necessary to evaluate integrated technologies and models for future operationalization into segments of the Air Force Weather Services (AFWS) in support of the 2018 National Defense Strategy (NDS) lines of effort. To improve readiness for a more lethal force, AFWS provides timely, accurate, resilient and relevant environmental information, to include space and terrestrial weather, for global battlespace situational awareness for Air Force (AF), Army, Special Operations Forces (SOF), combatant commands, and other government agencies. AFWS capabilities at home station and deployed provide critical support to the full spectrum of air and space combat operations. AFWS development enhances the lethality, effectiveness, and survivability of AF weapon systems and precision munitions by modernizing capability and seeking the military advantage to accurately predict friendly and foe environmental impacts to optimize mission execution and planning, targeting, weaponeering, battle damage assessment and space systems operations. To strengthen alliances and partnerships, AFWS development efforts integrate DoD, government agency, and commercial and international partner environmental data with AFWS information system equipment for processing, storing, exploiting and disseminating multi-domain weather information for analysis, forecasting, mission integration and greater interoperability. Funding for AFWS development also ensures greater performance and affordability through improvements to architecture and system efficiency, cybersecurity, joint all-domain command and control (JADC2)/advanced battle management system (ABMS)/sensing grid integration, migration to cloud computing, and expanding agile software development practices.

AFWS aligns activities under four capability areas: Weather Data Collection, Weather Data Analysis and Dissemination, Weather Forecasting, and Product Tailoring/Warfighter Applications. This alignment ensures an integrated and systems-oriented approach to program management decisions. A portion of the Weather Forecasting capability is addressed by APPN 3600, BA 04, PE 0604002F, Project 643560- Air Force Weather Services Research.

1. Weather Forecasting provides advanced scientific numerical weather prediction capabilities for automated, high resolution forecast products for mission planning, rehearsal, and execution. Space weather modeling assists in characterizing and forecasting the near-Earth environment to the sun, and enables space weather anomaly and space weather impact assessments. Weather Forecasting includes activities for Numerical Weather Modeling (NWM); Weather Services - Live, Virtual, Constructive (WS-LVC), and Space Weather Analysis and Forecast System (SWAFS). SWAFS is a software suite of 47 models and applications to ingest, process, and store space environmental data, run space environmental models to specify and forecast the near-earth environment, and run space effects characterization applications.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604002F / <i>Air Force Weather Services Research</i>
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This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	0.772	0.870	0.000	0.870
Current President's Budget	0.000	0.772	0.869	0.000	0.869
Total Adjustments	0.000	0.000	-0.001	0.000	-0.001
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-0.001	0.000	-0.001

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Space Weather Analysis and Forecast Radiation Exposure Model (SWAFS-RadEx)</p> <p><b>Description:</b> SWAFS-RadEx (Radiation Exposure) AFRL Analysis of Alternatives (AoA) and modeling to assess high-flyer radiation exposure.</p> <p><b>FY 2020 Plans:</b>                      In FY2020, a portion of PE 0305111F, Weather Services, Project 672738 efforts were transferred to PE 0604002F, Air Force Weather Services Research, Project 643560 in order to properly align Advanced Component Development and Prototype activities with the correct funding source.                      -Continue AFRL Analysis of Alternatives (AoA) started under PE0305111F in FY19 for existing RADEX models and begin technology maturation efforts.                      -Perform and exploit new data ingest of space weather observations.                      -Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain.                      Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc.</p> <p><b>FY 2021 Plans:</b>                      N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>	-	0.181	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604002F / <i>Air Force Weather Services Research</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Funding decreased to \$0 due to the decision to fund higher priority capabilities. Further work on RadEx is expected to be completed through NASA and NOAA. No further funding from PE 0604002F is scheduled at this time.				
<p><b>Title:</b> Space Weather Analysis and Forecast System (SWAFS) Magnetospheric Energetic Charged Particle Hazard Assessment (SWAFS- ECP HAS)</p> <p><b>Description:</b> SWAFS-ECP HAS AFRL Analysis of Alternatives (AoA) and modeling to assess Energetic Charged Particle (ECP) conditions throughout the global space environment to enable decision makers to determine cause of satellite anomaly.</p> <p><b>FY 2020 Plans:</b> In FY2020, a portion of PE 0305111F, Weather Services, Project 672738 efforts were transferred to PE 0604002F, Air Force Weather Services Research, Project 643560 in order to properly align Advanced Component Development and Prototype activities with the correct funding source. -Continue AFRL Analysis of Alternatives (AoA) started under PE0305111F in FY19 for existing ECP HAS models and begin technology maturation efforts. -Continue Magnetic Field Measuring (Magnetometer) AoA. -Perform and exploit new data ingest of space weather observations. -Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc.</p> <p><b>FY 2021 Plans:</b> -Continue AFRL AoA for existing ECP HAS models with the Space Environment Anomaly Resolution (SpEAR) tool to support Combined Space Operations Center (CSpOC) and Satellite Operations Squadrons (SOPS). - Collect and exploit new data ingest of space weather observations. - Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to, program office support, studies, technical analysis, and prototyping.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to allocation of funds to the Scintillation Nowcast Forecast study effort.</p>		-	0.591	0.288
<p><b>Title:</b> Space Weather Analysis and Forecast System (SWAFS) Scintillation Nowcast and Forecast Technology (SNFT) software upgrade</p> <p><b>Description:</b> SWAFS SNFT AFRL Analysis of Alternatives (AoA) to upgrade software allowing use of model algorithms that utilize sensor packages on the Constellation Observing System to monitor Meteorology, Ionosphere, and Climate (COSMIC II) to understand space environment conditions affecting satellites and communications.</p> <p><b>FY 2021 Plans:</b></p>		-	-	0.581

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604002F / <i>Air Force Weather Services Research</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
- Begin AFRL AoA for SNFT software. - Collect and exploit new data ingest of space weather observations. - Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to, program office support, studies, technical analysis, and prototyping.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased due to the beginning of SNFT AoA through the AFRL.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	0.772	0.869

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTE 07 0305111F: <i>WEATHER SERVICE</i>	3.621	2.357	2.185	-	2.185	3.035	3.051	3.816	3.022	0.000	21.087

**Remarks**  
0305111F BPAC 672738 3600 funds on Air Force PE located in IDECS.

**E. Acquisition Strategy**  
SWAFS will use individual FAR-based and rapid acquisition contracting methods, as well as AFRL for development works (Technology Readiness Level (TRL) 6 and below) to develop AoA, design solutions, and prototype code.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604002F / Air Force Weather Services Research	<b>Project (Number/Name)</b> 643560 / AF Weather Services Research

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>SWAFS-RadEx</b>	
SWAFS-RadEx Analysis of Alternatives	████████████████████
<b>SWAFS-ECP HAS</b>	
SWAFS-ECP HAS Analysis of Alternatives	████████████████████
<b>Scintillation Nowcast</b>	
Forecast Model Update Analysis of Alternatives	██
<b>Solar Wind</b>	
Solar Wind Model Analysis of Alternatives	██

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604002F / Air Force Weather Services Research	<b>Project (Number/Name)</b> 643560 / AF Weather Services Research

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>SWAFS-RadEx</b>				
SWAFS-RadEx Analysis of Alternatives	1	2020	4	2020
<b>SWAFS-ECP HAS</b>				
SWAFS-ECP HAS Analysis of Alternatives	1	2020	4	2020
<b>Scintillation Nowcast</b>				
Forecast Model Update Analysis of Alternatives	1	2021	4	2022
<b>Solar Wind</b>				
Solar Wind Model Analysis of Alternatives	1	2022	4	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 4: <i>Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	8.000	302.323	0.000	302.323	449.290	590.878	1,087.601	832.229	Continuing	Continuing
640141: <i>Advanced Battle Management System (ABMS)</i>	-	0.000	8.000	302.323	0.000	302.323	449.290	590.878	1,087.601	832.229	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
 ABMS FY20 total budget request was \$185.6M between PE 0604003F BA 07 and MDC2 PE 0304115F BA 07. Of that request, \$143.6M was enacted for FY20. The enacted funding for FY20 in this BPAC only reflects an \$8M Congressional add. See Section D, Other Program Funding, for a total summation of enacted funds for FY20 ABMS requirements still held in legacy PEs and BPACs.

**A. Mission Description and Budget Item Justification**

The Advanced Battle Management System (ABMS) portfolio develops the digital infrastructure and tools required for the joint force to provide operationally relevant and fieldable capabilities in support of the National Defense Strategy (NDS). ABMS addresses gaps in interoperability and information sharing for air, land, sea, space, and cyberspace domains. The ABMS lines of effort accelerate the development, integration, transition, and fielding of technologies that enable Joint All-Domain Command and Control.

ABMS investments are divided into seven categories of activities.

Digital Architectures, Standards, and Concept Development: This includes digital engineering and analysis, model-based systems engineering, and related analyses and exploration in support of potential investments in the other six categories.

Sensor Integration: This includes the development, test, and integration of open architecture sensor system. These systems will be based on government-owned standards and provide open and reusable capabilities, initially focused on air and ground moving target indication (AMTI, GMTI).

Multi-Domain Data Management: This includes cloud-based data libraries, data feeds, data wrappers, and data management to improve data discoverability and information sharing across the joint force.

Multi-Domain Secure Processing: This includes hardware and software for multi-level security as well as edge hardware to enable a full range of military operations

Multi-Domain Connectivity: This includes maturation and integration of open software-defined radios and networks, government-owned waveform libraries, and wideband multi-function RF systems. This category also includes the integration and standards required to leverage advances in commercial technology such as 5G networks and proliferated low-earth orbit satellite communications.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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Multi-Domain Applications: This includes cloud-based applications to process sensor data, fuse sensor data from multiple platforms across different domains, combine data into a common multi-domain operating picture, and provide battle management, command, and control (BMC2) functionality.

Effects Integration: This includes development and integration of open smart munitions that enable dynamic kill webs, attritable aircraft that generate combat mass and distributed effects, and real-time updates to mission data files to improve electronic warfare system performance.

The ABMS approach is not a traditional systems acquisition. Instead of acquisition of platforms, ABMS is moving to acquisition of capabilities that are open, available, deployable, and reconfigurable for installation on or use by multiple systems across multiple domains. These capabilities increase the effectiveness and survivability of Air Force, joint, and coalition partners across permissive and contested environments, in all warfighting domains, and at multiple classification levels. ABMS will leverage existing and emerging technology with emphasis on commercial technology and those at technology readiness levels that will enable rapid transition. The innovations from ABMS will augment new and ongoing initiatives aligned with service multi-domain operational priorities.

ABMS funding provides for operational concept development and demonstration, hardware development and integration, and software development and integration. The funding will also enable the limited transition of mature and ready capabilities to appropriate programs of record in synchronization with planned modernization activities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver JADC2 capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	8.000	302.323	0.000	302.323
Total Adjustments	0.000	8.000	302.323	0.000	302.323
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	8.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	302.323	0.000	302.323

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 4: <i>Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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**Change Summary Explanation**

The ABMS effort was executed in FY20 under BA07 in PE 0604003F and PE 0304115F. In FY21 the funding for both PEs was aligned under BA04 in PE 0604003F for overall efficiency and effort clarity. This is not a New Start. See Section D, Other Program Summary to trace all funds.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<p><b>Title:</b> Advanced Battle Management System</p> <p><b>Description:</b> ABMS leverages and complements ongoing efforts and emerging technologies across services, agencies, laboratories, and industry partners. The hardware development approach is based on continuous integration and delivery of incremental capability improvement over time, with emphasis on open and modular systems that can be rapidly transitioned and widely deployed. Software will be deployed using a development/security/operations (DevSecOps) approach with multiple partners. Key points of emphasis include open and reusable software, cloud deployments for scaling and data management, and cyber resiliency. The DevSecOps approach directed by DoD facilitates integration efforts by traditional and non-traditional software providers, with or without prime contractor involvement.</p> <p>ABMS executes onramp events with a COCOM sponsor every four months. These events show proposed technical solutions across the ABMS product lines, demonstrate capabilities being developed in an operationally-relevant scenario, and have the potential to generate leave-behind capabilities if requested. The participating platforms and COCOMs will vary from event to event. Capabilities developed in the ABMS portfolio will be presented at onramp events as they become ready for demonstration, with multiple capabilities being demonstrated at each event. Each event informs the next development sprint as well as future events while also reducing technology risk. This approach also facilitates rapid integration by making the technology visible and performing initial operationally-relevant testing for a broad COCOM audience. Specific event costs are contained in the JADC2 PE 3040115F (BPAC 673380), formerly known as MDC2, while development costs are contained in the ABMS PE.</p> <p><b>FY 2020 Plans:</b> Develop airborne gateway technology for rapid connection and information sharing between existing platforms. The first successful demonstration of communications between F-22 and F-35 using gateways was in December 2019. Test new sensor mesh networks including connection to proliferated low-earth orbit (LEO) commercial satellite communications. The first successful demonstration of this multi-domain mesh network was in December 2019. Additional hardware-related activities in FY 2020 include design of a radar testbed, continued capability improvements to gateways, test of a multi-level secure tablet, continued capability improvements to sensor mesh networks, and initial development of advanced radios and apertures.</p> <p>Develop cloud-based tools for processing of sensor data, fusion of data across platforms and domains, combining data into a multi-domain common operating pictures, and battle management, command, and control (BMC2). The first successful demonstration of this software suite was in December 2019. Additional software-related activities in FY 2020 include creation of</p>	-	8.000	302.323

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>a radar mode library, waveform upgrades to gateways, and initial tests of software tools and cloud access on a multi-level secure tablet.</p> <p>The first on ramp event was held in December 2019 at Eglin AFB and was led by NORAD and USNORTHCOM. This ABMS onramp included Air Force, Army, and Navy system with key first in the areas of connectivity between platforms, mesh networking, and cloud-based battle management. The next FY2020 events will be held in April 2020 and August 2020.</p> <p><b>FY 2021 Plans:</b> Continue airborne gateway technology development with initial installation on XQ-58 Valkyrie unmanned aircraft. Start development of gateway hardware for KC-46 tanker. First test of radar testbed, expansion of multi-level secure tablet to additional security levels, first operational test of edge processing hardware for disconnected/disadvantaged operations, laboratory test of wideband radios and apertures, initial design of sensor payloads for attritable aircraft, additional technology development and integration based on emerging technology and warfighter needs</p> <p>Continue development, small-scale deployment, and test of cloud-based tools for data processing, data fusion, common operating pictures, and BMC2. Begin using digital systems engineering model to evaluate trades across multiple systems. Continue gateway testing, including new waveform upgrades. Continue testing software tools and cloud access on a multi-level secure tablet. Pursue additional software development, deployment, and scaling based on emerging technology and warfighter needs.</p> <p>The ABMS portfolio will continue to advance concepts and capabilities based on lessons learned from FY2020 events. FY2021 efforts will also include integration of event data with the digital system model. It is important to note that there is no pre-defined or realized objective system. Capabilities are introduced in a rapid fashion building on previous development sprints and events with consistent transition to the field. FY2021 events are planned for December 2020, April 2021 and August 2021 with smaller-scale test events between the planned events.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY20 (\$144.491M, see Section D for totals including other program funding) to FY21 (\$302.323M) delta is \$157.832M. Additional funds enable continued development of FY20 accomplishments and cumulative integration and incorporation into FY21 objectives.</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		-	8.000	302.323

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>			<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• RDTE 07 0604003F: <i>Advanced Battle Management System (ABMS)</i>	27.883	35.611	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	63.494
• RDTE 07 0304115F: <i>Multi Domain Command and Control (MDC2)</i>	0.000	100.880	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	100.880

**Remarks**

Beginning in FY21 the MDC2 PE 0304115F (also known as Joint All Domain Command and Control, JADC2), provides non-RDT&E operations and infrastructure support elements for Joint All Domain Command and Control. All MDC2 (JADC2) technology development (RDT&E) is executed through the ABMS PE.

**E. Acquisition Strategy**

ABMS will provide capability through existing program office, program executive officers, service labs, services or agencies, programs of record, and their respective contracts and agreements. ABMS is not a single program of record. Many lines of effort will be horizontally integrated by the USAF Chief Architect and partner organizations. Program execution (cost, schedule, and performance) will be managed by the Chief Architect Integration Office and the appropriate program office.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	<b>Project (Number/Name)</b> 640141 / <i>Advanced Battle Management System (ABMS)</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ABMS HW, SW & On Ramps	Various	Product Line Owners : Various	-	-		8.000		302.323		-		302.323	Continuing	Continuing	-
<b>Subtotal</b>			-	-		8.000		302.323		-		302.323	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	-		8.000		302.323		-		302.323	Continuing	Continuing	N/A

**Remarks**  
 In FY20 this effort was held in MDC2 PE 0304115F BA 07 (now known as JADC2) and ABMS PE 0604003F BA 07; the two PEs were merged under the ABMS PE 0604003F BA 04 in FY21.  
  
 Please see section D: Other Program Funding Summary to see comprehensive level of funding for FY21.



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	<b>Project (Number/Name)</b> 640141 / <i>Advanced Battle Management System (ABMS)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>ABMS Execution</b>				
Software Development and Integration	1	2020	4	2025
Hardware Maturation and Demonstration	1	2020	4	2025
Demonstration/On Ramp Events	1	2020	4	2025
<b>FY21 Milestones</b>				
FY21 On Ramp 1	1	2021	1	2021
FY21 On Ramp 2	3	2021	3	2021
FY21 On Ramp 3	4	2021	4	2021



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>					<b>R-1 Program Element (Number/Name)</b>							
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					PE 0604004F / <i>Advanced Engine Development</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	696.099	671.442	636.495	0.000	636.495	111.830	208.687	218.644	0.000	0.000	2,543.197
643608: <i>Advanced Engine Dev</i>	-	696.099	671.442	636.495	0.000	636.495	111.830	208.687	218.644	0.000	0.000	2,543.197
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Advanced Engine Development Program enables demonstration of advanced turbine engine prototypes. This program is maturing fuel efficient adaptive engine component technologies and reducing associated risk in preparation for next-generation propulsion system development for combat aircraft applications. Adaptive engine technology enables next generation combat aircraft capabilities by combining the efficiency of high bypass turbofans used by commercial airlines with the performance demanded of military fighter engines. This technology has undergone initial development under the auspices of the Air Force Research Laboratory through the Adaptive Engine Technology and Adaptive Engine Technology Demonstrator programs.

In addition, this program element may include necessary civilian pay expenses required to manage, execute, and deliver advanced engine capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	720.355	878.442	637.657	0.000	637.657
Current President's Budget	696.099	671.442	636.495	0.000	636.495
Total Adjustments	-24.256	-207.000	-1.162	0.000	-1.162
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-207.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-24.256	0.000			
• Other Adjustments	0.000	0.000	-1.162	0.000	-1.162

**Change Summary Explanation**

Decrease in FY 2020 of \$207.000 million is due to a Congressional directed reduction in the Department of Defense Appropriations Act 2020 for funding excess to need.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604004F / <i>Advanced Engine Development</i>
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Decrease in FY 2021 of \$1.162 million is due to Department of Defense inflation adjustments.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Adaptive Engine Transition Program</p> <p><b>Description:</b> The Adaptive Engine Transition Program (AETP) will design and manufacture multiple flight-weight adaptive engine prototypes, complete component rig assessments, characterize materials, and inform manufacturing process improvements. The program will demonstrate adaptive engine technology can be scaled to meet military fighter engine size requirements, while ensuring appropriate manufacturing and technology readiness levels by producing flight-weight prototypes. The prototype engines will demonstrate fuel efficiency increases, thrust increases, and new component technologies by performing sea-level, altitude, and durability assessments across multiple power settings. These assessments will provide data to quantify the capability and reduce risk in areas such as thermal capacity, reliability, and supportability, among others.</p> <p>The FY 2021 Budget Justification Exhibit has been updated to reflect the breakout of the FY2019 through FY 2021 Next Generation Adaptive Engine (NGAP) funds from the AETP effort to increase transparency to Congress. This breakout will be reflected in future Budget Exhibits.</p> <p><b>FY 2020 Plans:</b> Continue component rig activities. Continue technology, affordability, and sustainability studies. Continue engine fabrication. Begin engine assessments. Continue additional airframe integration/adaptive propulsion design efforts. More details can be provided in an appropriate forum.</p> <p><b>FY 2021 Plans:</b> Complete component rig activities. Complete technology, affordability, and sustainability studies. Complete engine fabrication and assessments. Complete airframe integration/adaptive propulsion design efforts. More details can be provided in an appropriate forum.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 decreased compared to FY 2020 by \$214.018 million. Funding decreased due to completion of numerous activities leading up to the final prototype ground-run demonstrations in FY 2021.</p>	589.729	447.449	233.431
<p><b>Title:</b> Next Generation Adaptive Propulsion</p> <p><b>Description:</b> The Next Generation Adaptive Propulsion (NGAP) effort will design and perform component risk reduction for flight-weight adaptive engine prototypes for next generation fighter applications. NGAP will demonstrate that adaptive engine technology can be scaled to meet next generation military fighter engine size requirements, while ensuring appropriate manufacturing and technology readiness levels.</p>	106.370	223.993	403.064

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604004F / <i>Advanced Engine Development</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>The FY 2021 Budget Justification Exhibit has been updated to reflect the breakout of the FY2019 through FY 2021 Next Generation Adaptive Engine (NGAP) funds from the AETP effort to increase transparency to Congress. This breakout will be reflected in future Budget Exhibits.</p> <p><b>FY 2020 Plans:</b> Conduct adaptive engine preliminary design activities for next generation fighter applications. More details can be provided in an appropriate forum.</p> <p><b>FY 2021 Plans:</b> Complete adaptive engine preliminary design activities for next generation fighter applications. More details can be provided in an appropriate forum.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 increased compared to FY 2020 by \$179.071 million. Funding increased due to continuation of preliminary design activities leading up to the initiation of prototyping activities in FY 2022.</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		696.099	671.442	636.495
<b>D. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>E. Acquisition Strategy</b>				
<p>For Adaptive Engine Transition Program, the Air Force has awarded two limited source, cost plus incentive fee contracts to General Electric and Pratt &amp; Whitney due to their unique qualifications to design a high performance, flight-weight adaptive turbine engine in the thrust class for AETP. Incentive categories include engine weight, performance factors, and maintainability and supportability, with specific metrics for each area incentivized. The government agency responsible for managing this program is the Air Force Life Cycle Management Center, Propulsion Directorate, Wright-Patterson Air Force Base, Ohio.</p>				

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604004F / <i>Advanced Engine Development</i>	<b>Project (Number/Name)</b> 643608 / <i>Advanced Engine Dev</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Adaptive Engine Transition Program - GE	C/CPIF	GE : Evendale, OH	-	336.645	Oct 2018	189.559	Oct 2019	94.607	Oct 2020	-		94.607	0.000	620.811	-
Adaptive Engine Transition Program - PW	C/CPIF	PW : East Hartford, CT	-	251.079	Oct 2018	251.522	Oct 2019	135.194	Oct 2020	-		135.194	0.000	637.795	-
Next Generation Adaptive Propulsion - GE	C/CPIF	GE : Evendale, OH	-	52.655	Oct 2018	109.579	Oct 2019	188.267	Oct 2020	-		188.267	Continuing	Continuing	-
Next Generation Adaptive Propulsion - PW	C/CPIF	PW : East Hartford, CT	-	51.710	Oct 2018	111.048	Oct 2019	211.167	Oct 2020	-		211.167	Continuing	Continuing	-
<b>Subtotal</b>			-	692.089		661.708		629.235		-		629.235	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Adaptive Engine Transition Program - Program Management Support	Various	Various : TBD	-	2.005	Dec 2018	6.367	Dec 2019	3.630	Dec 2020	-		3.630	0.000	12.002	-
Next Generation Adaptive Propulsion - Program Management Support	Various	Various : TBD	-	2.005	Dec 2018	3.367	Dec 2019	3.630	Dec 2020	-		3.630	Continuing	Continuing	-
<b>Subtotal</b>			-	4.010		9.734		7.260		-		7.260	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	696.099	671.442	636.495	-	636.495	Continuing	Continuing	N/A

**Remarks**  
The FY 2021 Budget Justification Exhibit has been updated to reflect the breakout of the FY2019 through FY 2021 Next Generation Adaptive Engine (NGAP) funds from the AETP effort to increase transparency to Congress. This breakout will be reflected in future Budget Exhibits.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604004F / <i>Advanced Engine Development</i>	<b>Project (Number/Name)</b> 643608 / <i>Advanced Engine Dev</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b><i>Adaptive Engine Transition Program</i></b>																												
Detailed Design, Engine Fabrication, Engine Assessments																												
<b><i>Next Generation Adaptive Propulsion</i></b>																												
Preliminary Design																												
Detailed Design, Engine Fabrication, Engine Assessments																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604004F / <i>Advanced Engine Development</i>	<b>Project (Number/Name)</b> 643608 / <i>Advanced Engine Dev</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Adaptive Engine Transition Program</i></b>				
Detailed Design, Engine Fabrication, Engine Assessments	1	2019	2	2022
<b><i>Next Generation Adaptive Propulsion</i></b>				
Preliminary Design	1	2019	1	2022
Detailed Design, Engine Fabrication, Engine Assessments	2	2022	2	2025

**Note**

The FY 2021 Budget Justification Exhibit has been updated to reflect the breakout of the FY2019 through FY 2021 Next Generation Adaptive Engine (NGAP) funds from the AETP effort to increase transparency to Congress. This breakout will be reflected in future Budget Exhibits.

The Adaptive Engine Transition Program consists of three phases: detailed design, engine fabrication, and engine assessments.

Program deliverables include: military adaptive engine detailed design parameters and models, multiple engine sets of hardware (plus spare parts), matured technologies, major rig assessment data (controls, combustor, etc.), program reviews, and technology, affordability and sustainability studies.

The Next Generation Adaptive Propulsion effort consists of four phases: Preliminary design, detailed design, engine fabrication, and engine assessments.

Program deliverables include: military adaptive engine detailed design parameters and models, engine hardware (plus spare parts), matured technologies, major rig assessment data (controls, combustor, etc.), program reviews, and technology, affordability and sustainability studies for next generation fighter aircraft.

Additional details can be provided in the appropriate forum.

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604015F / <i>Long Range Strike - Bomber</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	2,189.945	2,982.499	2,848.410	0.000	2,848.410	2,896.926	2,670.706	2,259.917	1,661.435	Continuing	Continuing
643308: <i>Long Range Strike Bomber</i>	-	2,189.945	2,982.499	2,848.410	0.000	2,848.410	2,896.926	2,670.706	2,259.917	1,661.435	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&S)/DSP.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	2,279.196	3,003.899	3,047.888	0.000	3,047.888
Current President's Budget	2,189.945	2,982.499	2,848.410	0.000	2,848.410
Total Adjustments	-89.251	-21.400	-199.478	0.000	-199.478
• Congressional General Reductions	-79.252	-21.400			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-9.999	0.000	-199.478	0.000	-199.478

**Change Summary Explanation**

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&S)/DSP.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> Long Range Strike Bomber	2,189.945	2,982.499	2,848.410
<b>Description:</b> Long Range Strike Bomber			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604015F / <i>Long Range Strike - Bomber</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b><i>FY 2020 Plans:</i></b> This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&amp;S)/DSP.</p> <p>This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&amp;S)/DSP.</p> <p><b><i>FY 2021 Plans:</i></b> Program continuation in 2021.</p> <p>This program is reported in accordance with Title 10, USC, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&amp;S)/DSP.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Continuation of program in 2021.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	2,189.945	2,982.499	2,848.410

**D. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• MILCON PE 0604015: <i>Long Range Strike Bomber</i>	-	-	-	-	-	291.827	112.700	38.000	195.000	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**  
This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&S)/DSP.



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604015F / Long Range Strike - Bomber	<b>Project (Number/Name)</b> 643308 / Long Range Strike Bomber
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Actual breakout provided in Special Access Program Annual Report to Congress	Various	N/A : NV	-	2,189.945		2,982.499		2,848.410		-		2,848.410	Continuing	Continuing	-
<b>Subtotal</b>			-	2,189.945		2,982.499		2,848.410		-		2,848.410	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	2,189.945		2,982.499		2,848.410		-		2,848.410	Continuing	Continuing	N/A

**Remarks**  
 This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&S)/DSP.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604015F / <i>Long Range Strike - Bomber</i>	<b>Project (Number/Name)</b> 643308 / <i>Long Range Strike Bomber</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Long Range Strike Bomber</i></b>	
Actual schedule provided in Special Access Program Annual Report to Congress	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604015F / <i>Long Range Strike - Bomber</i>	<b>Project (Number/Name)</b> 643308 / <i>Long Range Strike Bomber</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Long Range Strike Bomber</i></b>				
Actual schedule provided in Special Access Program Annual Report to Congress	1	2019	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604032F / <i>Directed Energy Prototyping</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	48.316	44.000	20.964	0.000	20.964	10.983	19.970	3.993	3.994	0.000	152.220
640200: <i>DE Prototyping</i>	-	48.316	44.000	20.964	0.000	20.964	10.983	19.970	3.993	3.994	0.000	152.220
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Directed Energy Prototyping Program integrates, demonstrates, evaluates, and prototypes high energy laser, high power microwave and other electromagnetic radiation or particle beam technologies. This Program addresses capability needs in airbase defense, precision strike and aircraft protect capabilities. The Directed Energy Prototyping Program bridges the gap between lab based technology demonstration under a controlled environment, and demonstration of a system in realistic environments with the intent of establishing successful acquisition, and operation or operational capability implementation.

This prototyping effort enables the ability to integrate the prototype systems with other operational systems required for the mission, conduct test and evaluation activities, and modify emerging directed energy technology systems based on prototyping activities to enable rapid fielding to the warfighter. The Directed Energy Prototyping Program allows acquisition program managers (capability developers) and warfighters (capability recipients and end users) to prototype, integrate, evaluate, and demonstrate candidate weapon technologies and assess them in an operational environment in partnership with Program Executive officers, schoolhouses, simulation facilities, major commands, combatant commands, and developmental planning organizations.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Directed Energy Prototyping weapon systems. It may also include necessary civilian pay expenses required to perform analysis and developmental activities required in support of the transition of weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604032F / <i>Directed Energy Prototyping</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	50.000	10.000	15.000	0.000	15.000
Current President's Budget	48.316	44.000	20.964	0.000	20.964
Total Adjustments	-1.684	34.000	5.964	0.000	5.964
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	34.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.684	0.000			
• Other Adjustments	0.000	0.000	5.964	0.000	5.964

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 640200: *DE Prototyping*

Congressional Add: *Program Increase - Directed Energy Prototyping*

Congressional Add: *Program increase - Counter-UAS targeting solution*

Congressional Add: *Unfunded Requirement*

Congressional Add Subtotals for Project: 640200

Congressional Add Totals for all Projects

	<b>FY 2019</b>	<b>FY 2020</b>
	48.316	0.000
	0.000	14.000
	0.000	20.000
Congressional Add Subtotals for Project: 640200	48.316	34.000
Congressional Add Totals for all Projects	48.316	34.000

**Change Summary Explanation**

Increase in FY 2021 of \$5.964 million due to additional emphasis on the acceleration of developing high power microwave counter-unmanned aerial system enhancements.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Directed Energy Capabilities	0.000	10.000	20.964
<b>Description:</b> Prototypes and evaluates Directed energy weapon technologies for Airbase Defense against unmanned aerial vehicles and cruise missiles, Precision Strike against electronic and conventional targets and Aircraft Defense against incoming threats.			
<b>FY 2020 Plans:</b>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604032F / <i>Directed Energy Prototyping</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
<p>Obtain High Energy Laser and High Power Microwave counter-unmanned aerial system prototypes currently available and evaluate them for mission effectiveness, time to field, logistics, and deployment requirements. These assets will be made available for test by the Directed Energy Prototyping Program, the Joint Directed Energy Test Center, White Sands Missile Range or other Air Force agency or Command. May conduct additional Directed Energy Prototyping work as directed by Air force senior leadership.</p> <p><b>FY 2021 Plans:</b> Continue to test and evaluate acquired systems to determine operational effectiveness. Results from operational testing will be used to consider program initiation. Opening operating location at Kirtland Air Force Base to support transition, test, and evaluation of directed energy technologies.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 increased compared to FY 2020 by \$10.964 million. Funding increased due to additional emphasis on the acceleration of high power microwave counter-unmanned aerial system enhancements and evaluations of high energy laser system operational effectiveness.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	10.000	20.964

	FY 2019	FY 2020
<p><b>Congressional Add:</b> Program Increase - Directed Energy Prototyping</p> <p><b>FY 2019 Accomplishments:</b> Conducted Congressionally directed efforts.</p> <p><b>FY 2020 Plans:</b> Not applicable.</p>	48.316	0.000
<p><b>Congressional Add:</b> Program increase - Counter-UAS targeting solution</p> <p><b>FY 2019 Accomplishments:</b> Not applicable.</p> <p><b>FY 2020 Plans:</b> Conduct Congressional directed efforts.</p>	0.000	14.000
<p><b>Congressional Add:</b> Unfunded Requirement</p> <p><b>FY 2019 Accomplishments:</b> Not applicable.</p> <p><b>FY 2020 Plans:</b> Conduct Congressional directed efforts.</p>	0.000	20.000
<b>Congressional Adds Subtotals</b>	48.316	34.000

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604032F / <i>Directed Energy Prototyping</i>
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**D. Other Program Funding Summary (\$ in Millions)**

**Remarks**

N/A

**E. Acquisition Strategy**

The Directed Energy Prototyping events have resulted in eight (8) systems considered for prototyping from Raytheon, Boeing, Lockheed Martin, ATA, Kord, and one (1) government system. With FY 2019 funding, four (4) Operational Prototype systems have been acquired based on technical maturity to test, three (3) high energy laser systems and one (1) high power microwave system. Overseas field assessments of the (4) four directed energy systems and extensive market research are being used to inform a competitive down selection in 2nd Quarter FY 2020 of additional directed energy systems, with a contract award in 3rd Quarter FY 2020. Build and operational test systems will be sourced from a consortium of 600+ vendors. Award(s) will be made with Other Transaction Authority based on a best value determination with Technical being the most important factor. Proposed system(s) will be technically assessed for effectiveness, time to field, maintenance, and sustainability. The government agency responsible for managing this program is the Air Force Life Cycle Management Center, Program Development & Integration Directorate, Wright-Patterson Air Force Base, Ohio.



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604032F / <i>Directed Energy Prototyping</i>	<b>Project (Number/Name)</b> 640200 / <i>DE Prototyping</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Directed Energy Airbase Defense Prototypes	C/Various	Various : Various	-	43.316	Sep 2019	8.000	May 2020	8.964	Nov 2020	-		8.964	Continuing	Continuing	-
Congressional Add: Program Increase Counter-UAS targeting solution	TBD	Not specified. : TBD	-	-		14.000	Sep 2020	-		-		-	0.000	14.000	-
Congressional Add: Unfunded Requirement	TBD	Not specified. : TBD	-	-		20.000	Sep 2020	-		-		-	0.000	20.000	-
<b>Subtotal</b>			-	43.316		42.000		8.964		-		8.964	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Directed Energy Airbase Defense Prototyping and Operational Testing	Various	Various : Various	-	0.000		0.000		10.000	Jun 2021	-		10.000	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		0.000		10.000		-		10.000	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Directed Energy Prototyping Program Administration	Various	AFLCMC : Various	-	5.000	Dec 2018	2.000	Oct 2019	2.000	Oct 2020	-		2.000	Continuing	Continuing	-
<b>Subtotal</b>			-	5.000		2.000		2.000		-		2.000	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	48.316	44.000	20.964	-	20.964	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604032F / <i>Directed Energy Prototyping</i>	<b>Project (Number/Name)</b> 640200 / <i>DE Prototyping</i>
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
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**Remarks**  
 FY 2021 - FY 2025 will concentrate on prototyping high energy laser and high power microwave systems for base area defense in preparation for transition to program of record. The program will make max use of Other Transactional Authorities (OTA) in anticipation of vendor selection within in FY 2020. Continued support will be provided to the recently established Directed Energy Transition Management Office, Kirtland Air Force Base, New Mexico supporting location.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604032F / <i>Directed Energy Prototyping</i>	<b>Project (Number/Name)</b> 640200 / <i>DE Prototyping</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Operational Prototypes</i></b>	
System Acquisition	
Competitive Downselect and test	
<b><i>Build and operational test</i></b>	
Initial build and test	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604032F / <i>Directed Energy Prototyping</i>	<b>Project (Number/Name)</b> 640200 / <i>DE Prototyping</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Operational Prototypes</i></b>				
System Acquisition	1	2019	3	2019
Competitive Downselect and test	4	2019	3	2020
<b><i>Build and operational test</i></b>				
Initial build and test	3	2020	4	2022

**Note**

FY 2021 - FY 2025 will concentrate on prototyping high energy laser and high power microwave systems for base area defense in preparation for transition to program of record. The program will make max use of Other Transactional Authorities (OTA) in anticipation of vendor selection within in FY 2020. Continued support will be provided to the recently established Directed Energy Transition Management Office, Kirtland Air Force Base, New Mexico supporting location.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	494.485	576.000	381.862	0.000	381.862	198.898	0.000	0.000	0.000	Continuing	Continuing
643882: <i>Air-Launched Rapid Response Weapon (ARRW)</i>	-	213.299	286.000	381.862	0.000	381.862	198.898	0.000	0.000	0.000	0.000	1,080.059
643885: <i>Hypersonic Conventional Strike Weapon (HCSW)</i>	-	281.186	290.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

The Hypersonic Prototyping program enables integration and demonstration of emerging hypersonic technologies in an operational or operational-like environment to capitalize on successful laboratory hypersonic research and development efforts with high warfighter priority. Integration and demonstration of hypersonic prototypes also allows leadership to make informed strategy and resource decisions based for future programs on the results of such hypersonic prototype demonstrations.

Hypersonic Prototyping enables a key linkage between research and development in the lab and fielding advanced technologies to the warfighter. Under this program, Air-Launched Rapid Response Weapon (ARRW) and Hypersonic Conventional Strike Weapon (HCSW) will accelerate the technology transfer of hypersonic technologies to enable a responsive, long range strike capability.

The Hypersonics Prototyping Program Element was new for FY 2019. In FY 2019, the entirety of Hypersonics prototyping efforts were transferred from PE 0604858F, Tech Transition Program, in order to provide increased transparency to Congress on Air Force prototyping activities as directed in the Department of Defense Appropriation Act 2019.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Hypersonic Prototyping weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	508.858	576.000	201.200	0.000	201.200
Current President's Budget	494.485	576.000	381.862	0.000	381.862
Total Adjustments	-14.373	0.000	180.662	0.000	180.662
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	2.761	0.000			
• SBIR/STTR Transfer	-17.134	0.000			
• Other Adjustments	0.000	0.000	180.662	0.000	180.662

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 643882: *Air-Launched Rapid Response Weapon (ARRW)*

Congressional Add: *Program increase - air-launched rapid response weapon*

Congressional Add Subtotals for Project: 643882

	<b>FY 2019</b>	<b>FY 2020</b>
	48.800	0.000
Congressional Add Subtotals for Project: 643882	48.800	0.000
	193.555	0.000
Congressional Add Subtotals for Project: 643885	193.555	0.000
Congressional Add Totals for all Projects	242.355	0.000

**Project:** 643885: *Hypersonic Conventional Strike Weapon (HCSW)*

Congressional Add: *Program Increase - Hypersonic Conventional Strike Weapon*

Congressional Add Subtotals for Project: 643885

**Change Summary Explanation**

Increase in FY 2021 of \$180.662 million to fully fund the Air-Launched Rapid Response Weapon (ARRW) effort.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>				<b>Project (Number/Name)</b> 643882 / <i>Air-Launched Rapid Response Weapon (ARRW)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
643882: <i>Air-Launched Rapid Response Weapon (ARRW)</i>	-	213.299	286.000	381.862	0.000	381.862	198.898	0.000	0.000	0.000	0.000	1,080.059
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Air-Launched Rapid Response Weapon (ARRW) project integrates Air Force and DARPA enabled system technologies into a prototype that will demonstrate the viability of this concept to be fielded as a long range prompt strike capability. ARRW will design, develop, manufacture, and test, a number of prototype vehicles to inform decisions concerning ARRW acquisition and production.

In FY 2019, ARRW efforts were transferred from PE 0604858F, Tech Transition Program to PE 0604033, Hypersonics Prototyping , Project 643882, Air-Launched Rapid Response Weapon (ARRW), in order to provide increased transparency to Congress on Air Force prototyping activities as directed in the Department of Defense Appropriations Act 2019.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air-Launched Rapid Response Weapon (ARRW) weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Air Launched Rapid Response Weapon (ARRW)	164.499	286.000	381.862
<b>Description:</b> Integrates Air Force and DARPA enabled system technologies into a prototype that will demonstrate the viability of this concept to be fielded as a long range prompt strike capability. ARRW will design, develop, manufacture, and test, a number of prototype vehicles to inform decisions concerning ARRW acquisition and production.			
<b>FY 2020 Plans:</b> Continue with ARRW design activities and complete the system critical design review. Construct and test the booster test vehicles.			
<b>FY 2021 Plans:</b> Continue with ARRW booster test flights 2 and 3. Manufacture and begin testing of the ARRW all-up round test vehicles.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 increased compared to FY 2020 by \$95.862 million. Funding increased in order to fully fund the ARRW program which includes hardware purchases for all-up round test vehicle manufacturing and flight test execution costs.			
<b>Accomplishments/Planned Programs Subtotals</b>	164.499	286.000	381.862

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>	<b>Project (Number/Name)</b> 643882 / <i>Air-Launched Rapid Response Weapon (ARRW)</i>
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	FY 2019	FY 2020
<b>Congressional Add:</b> Program increase - air-launched rapid response weapon	48.800	0.000
<b>FY 2019 Accomplishments:</b> Conducted Congressionally directed efforts		
<b>FY 2020 Plans:</b> Not applicable		
<b>Congressional Adds Subtotals</b>	48.800	0.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

Program office may require temporary relocatable structures for expansion to support workforce and meet mission requirements.

**D. Acquisition Strategy**

Acquisition Decision Memorandum (signed 3 May 2018) designated Air-Launched Rapid Response Weapon (ARRW) as Section 804 Rapid Prototyping Program.

The Air Force awarded in August 2018 an undefinitized contract in order to complete a critical design review and procure all long lead parts and materials. The ARRW Program definitized this contract December 2019 to include the entire RDT&E effort (through the end of flight test). The cost type contract includes schedule incentives to earn a higher fixed fee. The government agency responsible for managing this program is the Air Force Life Cycle Management Center, Armament Directorate, Eglin AFB, FL.



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>	<b>Project (Number/Name)</b> 643882 / <i>Air-Launched Rapid Response Weapon (ARRW)</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ARRW - Contract	C/CPFF	LMCO: Various : TBD	-	186.378	Feb 2019	233.355	Feb 2020	312.971	Feb 2021	-		312.971	Continuing	Continuing	-
ARRW - Mission Planning	C/CPFF	Boeing: Tapestry : TBD	-	0.329	Mar 2019	1.000	Mar 2020	1.450	Mar 2021	-		1.450	Continuing	Continuing	-
ARRW - Aircraft Integration	Various	Various : TBD	-	5.272	Dec 2018	10.650	Dec 2019	10.239	Dec 2020	-		10.239	Continuing	Continuing	-
<b>Subtotal</b>			-	191.979		245.005		324.660		-		324.660	Continuing	Continuing	N/A

**Remarks**

ARRW - This effort is part of the DARPA Other Transaction Authority (OTA) and Air Force contracts.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ARRW - Government Test	Various	Various : TBD	-	15.470	May 2019	31.094	May 2020	46.728	May 2021	-		46.728	Continuing	Continuing	-
<b>Subtotal</b>			-	15.470		31.094		46.728		-		46.728	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ARRW - Program Management Administration	Various	Multiple : TBD	-	5.850	Sep 2019	9.901	Sep 2020	10.474	Sep 2021	-		10.474	Continuing	Continuing	-
Temporary Relocatable Structure	C/TBD	Not specified : TBD	-	-		-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	5.850		9.901		10.474		-		10.474	Continuing	Continuing	N/A

**Remarks**

Includes A&AS support requirements plus TDY, and office supplies.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Air Force							<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 3600 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>			<b>Project (Number/Name)</b> 643882 / <i>Air-Launched Rapid Response Weapon (ARRW)</i>				
	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>		
<b>Project Cost Totals</b>	-	213.299	286.000	381.862	-	381.862	Continuing	Continuing	N/A		

**Remarks**  
 Additional details on Hypersonics prototyping concepts can be provided in the appropriate forum.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>	<b>Project (Number/Name)</b> 643882 / <i>Air-Launched Rapid Response Weapon (ARRW)</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Air Launched Rapid Response Weapon (ARRW)</i></b>	
ARRW- Contract	[REDACTED]
Design and Preliminary Design Review	[REDACTED]
Design and Critical Design Review	[REDACTED]
Flight Tests	[REDACTED]

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>	<b>Project (Number/Name)</b> 643882 / <i>Air-Launched Rapid Response Weapon (ARRW)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Air Launched Rapid Response Weapon (ARRW)</i></b>				
ARRW- Contract	1	2019	4	2022
Design and Preliminary Design Review	1	2019	2	2020
Design and Critical Design Review	2	2020	4	2020
Flight Tests	3	2019	4	2022

**Note**

Further schedule details can be provided in the appropriate forum.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>				<b>Project (Number/Name)</b> 643885 / <i>Hypersonic Conventional Strike Weapon (HCSW)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
643885: <i>Hypersonic Conventional Strike Weapon (HCSW)</i>	-	281.186	290.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Hypersonic Conventional Strike Weapon (HCSW) Project integrates Air Force, Strategic Capabilities Office, and Conventional Prompt Strike (CPS) glide body into a prototype that will demonstrate the viability of this concept to be fielded as a long range prompt strike capability. HCSW will design, develop, manufacture, and test, a number of prototype vehicles to inform decisions concerning future HCSW acquisition and production.

In FY 2019, HCSW efforts were transferred from PE 0604858F, Tech Transition Program, to PE 0604033F, Hypersonics Prototyping, Project 643885, Hypersonic Conventional Strike Weapon (HCSW), in order to provide increased transparency to Congress on Air Force prototyping activities as directed in the Department of Defense Appropriations Act 2019.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver HCSW weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Hypersonic Conventional Strike Weapon (HCSW)	87.631	290.000	0.000
<b>Description:</b> Integrates Air Force enabled system technologies into a prototype that will demonstrate the viability of this concept to be fielded as a long range prompt strike capability. Hypersonic Conventional Strike Weapon (HCSW) will design, develop, manufacture, and test, a number of prototype vehicles to inform decisions concerning HCSW acquisition and production.			
In FY 2019, HCSW completed System Requirements Review (SRR) and Preliminary Design Review (PDR).			
<b>FY 2020 Plans:</b> Continue integration and design activities for the Hypersonic Conventional Strike Weapon. Identified key performance parameters and conduct Critical Design Review (CDR) leading up to the first flight test in December 2020.			
<b>FY 2021 Plans:</b> Not applicable based on current budget resources.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>	<b>Project (Number/Name)</b> 643885 / <i>Hypersonic Conventional Strike Weapon (HCSW)</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
FY 2021 decreased compared to FY 2020 by \$290.000 million. Funding decreased due to higher Department of Defense and Air Force priorities to fund only one of the two Air Force hypersonic prototyping efforts.				
<b>Accomplishments/Planned Programs Subtotals</b>		87.631	290.000	0.000
		<b>FY 2019</b>	<b>FY 2020</b>	
<b>Congressional Add:</b> Program Increase - Hypersonic Conventional Strike Weapon		193.555	0.000	
<b>FY 2019 Accomplishments:</b> Conducted Congressionally directed activities.				
<b>FY 2020 Plans:</b> Not Applicable				
<b>Congressional Adds Subtotals</b>		193.555	0.000	
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
Program office requires relocatable facilities for expansion to support workforce and meet mission requirements.				
<b>D. Acquisition Strategy</b>				
Acquisition Decision Memorandum (signed 3 May 2018) designated Hypersonic Conventional Strike Weapon (HCSW) as Section 804 Rapid Prototyping Program.				
In April 2018, the Air Force awarded an Indefinite Delivery/Indefinite Quantity to Lockheed Martin Corporation Space for the design, development, engineering, systems integration, test, logistics, planning, and aircraft integration support of all the elements of a hypersonic, conventional, air-launched, stand-off weapon. The government agency responsible for managing this program is the Air Force Life Cycle Management Center, Armament Directorate, Eglin AFB, FL.				

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 4				PE 0604033F / Hypersonics Prototyping				643885 / Hypersonic Conventional Strike Weapon (HCSW)							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Hypersonic program office support, analysis, technical risk reduction, and development.	C/CPFF	Lockheed Martin : Huntsville, AL	-	238.442	Jan 2019	216.889	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	238.442		216.889		0.000		-		0.000	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Development & Prototyping	C/CPFF	Multiple: TBD : Various	-	30.888	Apr 2019	23.298	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	30.888		23.298		0.000		-		0.000	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	C/CPAF	Multiple: TBD : Various	-	7.168	Jan 2019	38.026	Jan 2020	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	7.168		38.026		0.000		-		0.000	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Temporary Relocatable Structure	C/TBD	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Management Services	C/TBD	Multiple: TBD : Various	-	4.688	Sep 2019	11.787	Mar 2020	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	4.688		11.787		0.000		-		0.000	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>	<b>Project (Number/Name)</b> 643885 / <i>Hypersonic Conventional Strike Weapon (HCSW)</i>
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

**Remarks**  
Includes A&AS support requirements, TDY, office supplies, and assessed penalties/withholds.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	281.186	290.000	0.000	-	0.000	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>	<b>Project (Number/Name)</b> 643885 / <i>Hypersonic Conventional Strike Weapon (HCSW)</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Hypersonic Conventional Strike Weapon (HCSW)</i></b>	
Design and Preliminary Design Review	██████████
Critical Design Review and First Flight Test	██████████

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604033F / <i>Hypersonics Prototyping</i>	<b>Project (Number/Name)</b> 643885 / <i>Hypersonic Conventional Strike Weapon (HCSW)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Hypersonic Conventional Strike Weapon (HCSW)</i></b>				
Design and Preliminary Design Review	1	2019	4	2019
Critical Design Review and First Flight Test	1	2020	1	2021

**Note**

Further schedule details can be provided in the appropriate forum.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	86.445	124.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	211.045
641030: <i>GPS Receiver Development</i>	-	86.445	124.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	211.045

**A. Mission Description and Budget Item Justification**

PE 0604201F, Project 641030 covers the research, development, qualification, and testing of Enhanced Anti-Jam (EAJ) Military Code (M-Code) Global Positioning System (GPS) receivers for Air Force and joint weapon systems. This includes updates to weapon mission planning software to support new M-Code and EAJ receiver development. These acquisitions will enable the Air Force to increase its operational Position, Navigation, and Timing (PNT) resiliency while satisfying the DoD and civil mandates. Fielding of EAJ M-Code weapons requires the research, development, qualification and testing of M-Code receivers across the Air Force Program Executive Officer (AFPEO) Weapons Portfolio. Funds may be used to address emerging and short notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver M-Code GPS receiver capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	81.271	92.600	0.000	0.000	0.000
Current President's Budget	86.445	124.600	0.000	0.000	0.000
Total Adjustments	5.174	32.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	32.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	8.000	0.000			
• SBIR/STTR Transfer	-2.826	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 641030: *GPS Receiver Development*

Congressional Add: *Program Increase - M-Code EAJ*

Congressional Add Subtotals for Project: 641030

Congressional Add Totals for all Projects

	FY 2019	FY 2020
	-	32.000
	-	32.000
	-	32.000

**Change Summary Explanation**

FY 2019 increase of \$8.0M due to a below threshold reprogramming for M-Code weapons receiver development and a decrease of -\$2.156M for Small Business Innovative Research (SBIR).

FY 2020 Congressional Add of \$32M for M Code EAJ

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604201F / PNT Resiliency, Mods, and Improvements				<b>Project (Number/Name)</b> 641030 / GPS Receiver Development			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
641030: GPS Receiver Development	-	86.445	124.600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	211.045
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This munitions receiver development project includes development of a GPS M-code receiver with EAJ and analysis efforts. M-code receivers with EAJ provide advanced positioning, navigation, and timing (PNT) capabilities required for weapons to operate in adversarial anti-access/area denial (A2/AD) environments. M-Code receivers with EAJ also provide increased accuracy, better signal acquisition, and advanced security.

M-code receivers with EAJ capability assures continued weapon system precision and lethality.

Fielding EAJ M-Code weapons requires the research, development, qualification, testing, and mission planning of M-Code receivers across the Weapons Portfolio. This will include all systems, subsystems, software, fuzing, and support activities associated with the development and implementation of M-Code receivers.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver M-Code GPS receiver capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> M-Code EAJ	86.445	92.600	0.000
<b>Description:</b> M-Code/EAJ receivers provide an enhanced anti-jam capability. M-Code/EAJ receivers provide the capability to operate in increasing adversarial A2/AD jamming environment. M-Code/EAJ receivers also provide increased accuracy, better signal acquisition, and advanced security.			
<b>FY 2020 Plans:</b> Conduct research, development, qualification, and testing of M-Code/EAJ receivers across the AFPEO Weapons portfolio.			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased in accordance with planned development activities.			
<b>Accomplishments/Planned Programs Subtotals</b>	86.445	92.600	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604201F / PNT Resiliency, Mods, and Improvements	<b>Project (Number/Name)</b> 641030 / GPS Receiver Development

	FY 2019	FY 2020
<b>Congressional Add:</b> Program Increase - M-Code EAJ	-	32.000
<b>FY 2020 Plans:</b> Funds M-Code GPS receiver development for five munitions manufactured by three different contractors. Develop and test Strategic Anti-Jam Beamforming Receiver-Modernized (SABR-M) receiver prototype, continue design and development of High Anti-Jam Miniature M-Code Enhanced Receiver (HAMMER), and support design of JASSM Anti-Jam GPS Receiver (JAGR) M-Code capability.		
<b>Congressional Adds Subtotals</b>	-	32.000

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• RDTE 07 0207325F: <i>Joint Air-to-Surface Standoff Missile (JASSM)</i>	4.073	0.000	0.000	-	0.000	0.000	-	-	-	0.000	4.073
• RDTE 05 PE 0604329F, BPAC 655191: <i>SDB Increment II</i>	25.911	11.439	11.340	-	11.340	0.000	-	-	-	0.000	48.690
• RDTE 05 0604602F: <i>Armament/Ordnance Development</i>	4.469	-	-	-	-	-	-	-	-	0.000	4.469
• RDTE 04 PE 0604327F, BPAC 645341: <i>Direct Strike Penetrators</i>	4.500	0.000	2.150	-	2.150	-	-	-	-	0.000	6.650
• RDTE 05 0604618F: <i>Joint Direct Attack Munition</i>	-	-	7.926	-	7.926	-	-	-	-	0.000	7.926

**Remarks**

**D. Acquisition Strategy**

M-Code/EAJ effort uses a family of systems approach where the three prime weapons contractors develop receivers capable of operating in any of their Air Force weapons. The receivers are based on a common, internally-developed interface requirements specification (IRS), technology requirement document (TRD), and threat scenarios. This approach uses a combination of contract types based on acquisition phase (Technology Maturation & Risk Reduction (TMRR), Development, Production) and risk. The weapons system program offices share a common development program element (PE) to allow flexibility in funding and planning, switching to individual PEs for receiver integration, operational testing, and production. The M-Code/EAJ Weapons Receiver Development effort leverages technology currently under development by the Military GPS User Equipment (MGUE) program and will provide the warfighter with unmatched capability to operate in future A2/AD environments.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604201F / PNT Resiliency, Mods, and Improvements	<b>Project (Number/Name)</b> 641030 / GPS Receiver Development
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Common Weapons M-Code Receiver Development (SDB II)	Various	Raytheon : Tucson, AZ	-	29.772	Jan 2019	43.600	Oct 2019	-		-		-	0.000	73.372	-
Common Weapons M-Code Receiver Development (CAAP ASIC)	MIPR	DMEA/Global Foundries : Hopewell Junction, NY	-	6.230	Feb 2019	9.700	May 2020	-		-		-	0.000	15.930	-
Common Weapons M-Code Receiver Development (JDAM/MOP/ SDB I Phase II)	Various	Boeing : St Louis, MO	-	12.518	Feb 2019	24.100	Oct 2019	-		-		-	0.000	36.618	-
Common Weapons M-Code Receiver Development (AJ ASIC)	Various	Collins Aerospace : Cedar Rapids, IA	-	6.511	Feb 2019	6.400	Feb 2020	-		-		-	0.000	12.911	-
Common Weapons M-Code Receiver Development (AJ ASIC/ MIPR)	Various	DMEA/Global Foundries : Hopewell Junction, NM	-	4.000	Feb 2019	6.000	Oct 2019	-		-		-	0.000	10.000	-
Common Weapons M-Code Receiver Development (Pre-EMD JASSM)	Various	Lockheed Martin : Orlando, FL	-	5.700	Nov 2018	7.100	Oct 2019	-		-		-	0.000	12.800	-
Common Weapons M-Code Receiver Development (JASSM C+ + Phase II)	Various	Lockheed Martin : Orlando, FL	-	5.300	Nov 2018	6.900	Oct 2019	-		-		-	0.000	12.200	-
Common Weapons M-Code Receiver Development (JASSM MCU)	Various	Lockheed Martin : Orlando, FL	-	13.879	Feb 2019	18.800	Oct 2019	-		-		-	0.000	32.679	-
<b>Subtotal</b>			-	83.910		122.600		-		-		-	0.000	206.510	N/A





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>	<b>Project (Number/Name)</b> 641030 / <i>GPS Receiver Development</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>M-Code/EAJ Receivers</b>	
M-Code/EAJ Research, Development & Qualification	[REDACTED]
M-Code/EAJ Test and Evaluation	[REDACTED]

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>	<b>Project (Number/Name)</b> 641030 / <i>GPS Receiver Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>M-Code/EAJ Receivers</i></b>				
M-Code/EAJ Research, Development & Qualification	1	2019	2	2021
M-Code/EAJ Test and Evaluation	3	2020	2	2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604257F / <i>Advanced Technology and Sensors</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	34.585	23.145	24.747	0.000	24.747	60.729	61.415	34.818	10.123	Continuing	Continuing
644818: <i>Imaging and Targeting Support</i>	-	26.665	16.987	15.914	0.000	15.914	16.130	16.109	9.941	10.123	Continuing	Continuing
645148: <i>Common Airborne Sense and Avoid (C-ABSAA)</i>	-	7.920	6.158	8.833	0.000	8.833	44.599	45.306	24.877	0.000	Continuing	Continuing

**Note**

In FY2021, PE 0604257F (Advanced Technology and Sensors), Project 645148, (Common Airborne Sense and Avoid) funds were transferred to PE 0305206F, (Airborne Reconnaissance Systems), Project 674820,(Sensor Development) in order to align funding with Air Force project priorities and requirements.

**A. Mission Description and Budget Item Justification**

The Advanced Technology and Sensors (ATS) program coordinates the development of advanced technologies (sensors, data links, targeting support, and quick reaction capabilities) in support of multiple airborne reconnaissance platforms, both manned and unmanned. Its objectives are to develop, demonstrate, and rapidly transition advanced, interoperable, multi-platform solutions to reduce the find, fix, target, and track kill chain timeline, and to provide safe separation and collision avoidance for remotely piloted aircraft. This program coordinates the development of common collection, processing, and dissemination solutions for near-real time intelligence, surveillance, and reconnaissance. The ATS program also increases interoperability by developing common standards and interfaces.

The funds in this program are distributed in priority order for the goal of building a comprehensive Geospatial Intelligence (GEOINT) capability for the USAF. On an annual basis, developmental technologies are reviewed against warfighter capabilities and requirements based on strategic roadmaps and on the results of the Airborne Sensors for ISR Analysis of Alternatives, as prefaced in the Challenging Targets Initial Capabilities Document. Efforts advancing the technological maturity of promising sensors and processing capabilities are reviewed and prioritized into a recommended list for senior executive direction to implement in the coming year. The program office has the ability to rapidly initiate an Imaging & Targeting Support (I&TS) project in order to expedite development and acquisition of urgently needed capabilities for the warfighter.

The Air Force is pursuing a software intensive approach to maintain safe separation, avoid collisions, and provide the ability to safely integrate with other airspace users. The software solutions identified in this Information System Capability Development Document (IS-CDD) are open and modular and accept inputs from any type of sensor or data link and will operate any legacy and future Group 4 and 5 RPA. The effort includes technology maturation, risk reduction, EMD and life-cycle costs, such as: 1) prototyping activities, 2) streamlined development, test and implementation of the software, 3) development of open system architecture using modular design, standards-based interfaces, and widely-supported consensus-based standards, and 4) collaboration with the Federal Aviation Agency (FAA), National Aeronautics and Space Administration (NASA), and other services to develop national policy and standards.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	PE 0604257F / <i>Advanced Technology and Sensors</i>

Funds in any project can also cover activities to include studies and analysis to support both current program planning and execution and future program planning. This program element may include necessary civilian pay expenses required to manage, execute, and deliver technology and sensor capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	34.585	23.145	54.802	0.000	54.802
Current President's Budget	34.585	23.145	24.747	0.000	24.747
Total Adjustments	0.000	0.000	-30.055	0.000	-30.055
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-30.055	0.000	-30.055

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604257F / <i>Advanced Technology and Sensors</i>				<b>Project (Number/Name)</b> 644818 / <i>Imaging and Targeting Support</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
644818: <i>Imaging and Targeting Support</i>	-	26.665	16.987	15.914	0.000	15.914	16.130	16.109	9.941	10.123	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The purpose of the I&TS project is to develop, mature, demonstrate, and rapidly transition next-generation, persistent, wide area surveillance and common imagery reconnaissance sensor capabilities (active and passive systems), including sensor data processing, for multiple airborne platforms, as well as sensor products to aid in rapid targeting (e.g., geolocation models, sensor-based exploitation tools, sensor networking capabilities).

Developmental efforts pursued include improved sensor performance, new and improved sensor capabilities and modes, new and/or unique modalities, and enabling technologies. Improved sensor performance includes but is not limited to: increased geolocation accuracy, increased dismount detection capability, and advanced sensor data correlation. New and improved sensor capabilities include but are not limited to: Hyperspectral Imagery (HSI), Polarimetric Imaging (PI), Ground and Dismount Moving target indicator (GMTI/ DMTI), maritime search/track, Inverse Synthetic Aperture Radar, Foliage Penetration (FOPEN), and nuclear event detection. New and improved sensor modes include but are not limited to: high resolution imagery, Ground and Dismount Moving Target Indicator (GMTI/DMTI), persistent surveillance, wide area motion imagery, and Spectral Identification. New and unique sensor modalities include but are not limited to: low frequency SAR, Hyperspectral Imagery (HSI), and Light Detection And Ranging (LIDAR). Enabling Technologies include but are not limited to: automated and assisted target detection/recognition, Artificial Intelligence (AI), Machine Learning (ML), network centric warfare, integrated multi-sensor capabilities to detect and identify obscured targets, TCPED (Tasking, Collection, Planning, Exploitation, and Dissemination) improvements related to sensors, automated registration, and imagery product quality assurance.

These efforts are intended to accelerate delivery of data from sensor to user for both target search and target engagement (kill-chain) activities. This project will also increase interoperability by developing and advancing common standards (e.g. Open Mission Systems (OMS), Sensor Open System Architecture (SOSA), Common Open Architecture Radar Programs (COARPS), Multi-INT Common Open Architecture Reconnaissance Program Standard (MI-COARPS), National Imagery Transmission Format, AgilePod and data reduction) and interfaces.

Activities also include studies and analysis to support both current program planning and execution and future program planning. This program element may include necessary civilian pay expenses required to manage, execute, and deliver technology and sensor capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Imaging & Targeting Support (I&TS)	18.110	16.987	15.914

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604257F / <i>Advanced Technology and Sensors</i>	<b>Project (Number/Name)</b> 644818 / <i>Imaging and Targeting Support</i>

**B. Accomplishments/Planned Programs (\$ in Millions)**

**Description:** Corporately prioritized Air Force Multi-INT Portfolio of projects to develop and demonstrate next generation airborne sensors and processing technologies to further the art of the possible and/or transition ISR capabilities (ex: radar improvement, next-generation HSI, LIDAR, ISR Standards, EO/IR, and data mitigation technologies).

**FY 2020 Plans:**

- Continue to develop, modernize, and demonstrate lower TRL projects into transition ready efforts based on the prioritized portfolio. Efforts include but are not limited to advanced sensors, processing algorithms, and other GEOINT capabilities and techniques. The majority of the following FY 2020 efforts support Advanced Technology Demonstrations (ATDs) and rapid acquisition.
- Advanced Large Optical Freeform Telescope (ALOFT): Develop, demonstrate, & deliver a next-generation unobscured afocal (AFO) freeform optic telescope for long range ISR applications
  - Aether Spy: Initiate integration of future radar panels, DREX, processor, and power system into an AgilePod form factor
  - Work towards automating imagery exploitation and training using cloud services and deep learning running on processors carried by the platform aircraft (edge processing)
  - Common Open Architecture Radar Programs (COARPs) Compliant Detection Removal and Characterization Operation (DRACO): Development of COARPs compliant version of DRACO algorithms to serve as a pathfinder effort for the development of future on-board algorithms (edge processing)
  - Hyperspectral on a Chip (H-CHIP): Conduct SWIR/MWIR H-Chip Demonstration
  - Light Detection And Ranging (Lidar for Mid to High Altitude ISR and Battle Management): Conduct near term direct detect 3D lidar for multiple platforms, w/ readily upgradable architecture.
  - Multi-band Advanced Reconnaissance Long-range Image Experiment (MARLIE): Design, develop, and flight test a dual-band shortwave infrared/midwave infrared (SWIR/MWIR) fast framing capability
  - Multi-INT ATR for Geospatial Intelligence Capabilities (MAGIC): a multi-modal ATR (Assisted Target Recognition) system that combines complementary model-based (CAD) ATR and physics-based machine learning ATR via multi-modal, multi-look, multi-fidelity fusion
  - Predator/Reaper Off-board Sensing and Integrated Targeting (PROSIT): Integrate mature and emerging technologies for day and night targeting and laser target designation
  - Standoff High-altitude Enhanced Reconnaissance Long-range Operational Concept (SHERLOC): Extended range daytime imaging capability using fast-framing staring array camera with real-time image and full-motion video (FMV) products
  - SUAS Tactical Agile Gimbal (STAG): Develop the Air Force's modular gimbal housing enabling open competition for payloads

**FY 2021 Plans:**

Will continue to develop, modernize, and demonstrate lower TRL projects into transition ready efforts. The following FY20 efforts will continue into FY2021:

FY 2019	FY 2020	FY 2021

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604257F / <i>Advanced Technology and Sensors</i>	<b>Project (Number/Name)</b> 644818 / <i>Imaging and Targeting Support</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>- Common Open Architecture Radar Programs (COARPs) Compliant Detection Removal and Characterization (DRACO)</li> <li>- Automated imagery exploitation</li> <li>- Aether Spy</li> <li>- Multi-INT ATR for Geospatial Intelligence Capabilities (MAGIC)</li> </ul> <p>These efforts and new proposed projects will be approved through the GEOINT Capabilities Working Group (GCWG) Executive Element process. Efforts are approved in the fall prior to the start of the new fiscal year.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to support for other GCWG priorities and fund new I&amp;TS projects.</p>				
<p><b>Title:</b> Advanced Synthetic Aperture Radar System (ASARS) 2B</p> <p><b>Description:</b> Develop, design, fabricate, integrate, and test and field deep look high altitude ISR radar capabilities.</p> <p><b>FY 2020 Plans:</b> In FY2020 all funding in PE 0604257F, (Advanced Technology and Sensors), Project 644818, (Imaging and Targeting Support), was realigned to operationalize ASARS 2B.</p> <p><b>FY 2021 Plans:</b> N/A</p>		8.555	0.000	0.000
<b>Accomplishments/Planned Programs Subtotals</b>		26.665	16.987	15.914
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
Imaging and Targeting Support efforts are prioritized on an annual basis by the GCWG, in accordance with the validated gaps in the Challenging Targets Initial Capabilities Document. Resulting funded efforts are then contracted for and/or executed by either various program offices, laboratories, industry, and/or other government agencies.				
Acquisition strategy is to maximize commercial and national development efforts and investment through multiple contracting methods, including the use of Engineering Change Proposals to modify existing contracts and new contracts that were awarded both competitively or on a sole source basis.				

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604257F / <i>Advanced Technology and Sensors</i>	<b>Project (Number/Name)</b> 644818 / <i>Imaging and Targeting Support</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ALOFT	SS/CPFF	Collins : Westford, MA	-	1.078	Mar 2019	-		-		-		-	Continuing	Continuing	-
SHERLOC	SS/CPFF	Collins : Westford, MA	-	4.745	Nov 2018	4.700	Dec 2019	-		-		-	Continuing	Continuing	-
H-Chip	SS/CPFF	EO Vista : Acton, MA	-	4.030	Dec 2018	-		-		-		-	Continuing	Continuing	-
SUAS Tactical Agile Gimbal (STAG)	SS/CPFF	AES : Austin, TX	-	0.302	Nov 2018	-		-		-		-	Continuing	Continuing	-
Predator/Reaper Off-board Sensing and Improved Targeting (PROSIT)	SS/CPFF	Various : Various, OH	-	2.430	Nov 2018	0.799	Feb 2020	-		-		-	Continuing	Continuing	-
AgilePOD	SS/CPFF	Various : Various	-	1.597	Sep 2019	-		-		-		-	Continuing	Continuing	-
Multi-ATR	SS/CPFF	BAE : Durham, NC	-	1.388	Mar 2019	2.040	Feb 2020	0.360	Feb 2021	-		0.360	Continuing	Continuing	-
COARPS Compliant Detection Removal and Characterization (DRACO)	SS/CPFF	Lockheed Martin : Goodyear, AZ	-	-		1.800	Jun 2020	0.750	Jun 2021	-		0.750	Continuing	Continuing	-
Automated Electro-Optical Mobile Target Classification Deep Learning	SS/CPFF	Ball Aerospace : Dayton, OH	-	-		3.100	Feb 2020	2.640	Feb 2021	-		2.640	Continuing	Continuing	-
Aether Spy	SS/CPFF	Various : Various	-	-		2.600	Apr 2020	5.000	Mar 2021	-		5.000	Continuing	Continuing	-
New FY21 Technology Efforts (Prioritized by GCWG)	Various	Various : Various	-	-		-		5.619	Jan 2021	-		5.619	Continuing	Continuing	-
ASARS-2B operationalization	SS/CPFF	Raytheon : El Segundo, CA	-	9.368	Feb 2019	-		-		-		-	0.000	9.368	-
<b>Subtotal</b>			-	24.938		15.039		14.369		-		14.369	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMA: Other Govt Cost	Various	Various : Dayton, OH	-	1.727	Nov 2018	1.948	Nov 2019	1.545	Nov 2020	-		1.545	Continuing	Continuing	-





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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604257F / <i>Advanced Technology and Sensors</i>	<b>Project (Number/Name)</b> 644818 / <i>Imaging and Targeting Support</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Imaging and Targeting Support</b>																												
SHERLOC																												
H-Chip																												
ALOFT																												
Predator/Reaper Offboard Sensing and Improved Targeting (PROSIT)																												
SUAS Tactical Agile Gimbal (STAG) (MSGLPS 5" Gimbal Laser)																												
ITS - LIDAR																												
ITS - Other Technology Efforts (Prioritized by GCWG)																												
Advanced Airborne PCPAD-E Development																												
Multi-ATR																												
COARPS Compliant DRACO																												
Automated E/O Target Deep Learning																												
Aether Spy																												
MARLIE																												
ASARS-2B Technical Demonstration																												
ASARS-2B EMD																												
- NRE Contract Award (Feb 2019)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604257F / <i>Advanced Technology and Sensors</i>	<b>Project (Number/Name)</b> 644818 / <i>Imaging and Targeting Support</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Imaging and Targeting Support</i></b>				
SHERLOC	1	2019	4	2020
H-Chip	1	2019	3	2020
ALOFT	1	2019	1	2020
Predator/Reaper Offboard Sensing and Improved Targeting (PROSIT)	1	2019	2	2021
SUAS Tactical Agile Gimbal (STAG) (MSGLPS 5" Gimbal Laser)	1	2019	4	2019
ITS - LIDAR	1	2019	4	2025
ITS - Other Technology Efforts (Prioritized by GCWG)	1	2019	4	2025
Advanced Airborne PCPAD-E Development	1	2019	4	2025
Multi-ATR	2	2019	4	2021
COARPS Compliant DRACO	3	2020	1	2022
Automated E/O Target Deep Learning	2	2020	2	2022
Aether Spy	3	2020	4	2022
MARLIE	1	2019	1	2021
ASARS-2B Technical Demonstration	1	2019	3	2019
ASARS-2B EMD	2	2019	4	2019
- NRE Contract Award (Feb 2019)	2	2019	2	2019

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604257F / <i>Advanced Technology and Sensors</i>				<b>Project (Number/Name)</b> 645148 / <i>Common Airborne Sense and Avoid (C-ABSAA)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
645148: <i>Common Airborne Sense and Avoid (C-ABSAA)</i>	-	7.920	6.158	8.833	0.000	8.833	44.599	45.306	24.877	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Common-Airborne Sense and Avoid (C-ABSAA) project provides Group 4 and 5 Remotely Piloted Aircraft (RPA) with the ability to safely and effectively operate in all classes of airspace worldwide. The C-ABSAA project acts as a replacement for the sense and avoid capability of the pilot on board a manned aircraft.

The Air Force is pursuing a software intensive approach to maintain safe separation, avoid collisions, and provide the ability to safely integrate with other airspace users. The software solutions identified in this Information System Capability Development Document (IS-CDD) are open and modular and accept inputs from any type of sensor or data link and will operate any legacy and future Group 4 and 5 RPA. The effort includes technology maturation, risk reduction, EMD and life-cycle costs, such as: 1) prototyping activities, 2) streamlined development, test and implementation of the software, 3) development of open system architecture using modular design, standards-based interfaces, and widely-supported consensus-based standards, and 4) collaboration with the Federal Aviation Agency (FAA), National Aeronautics and Space Administration (NASA), and other services to develop national policy and standards.

The program element may include necessary civilian pay expenses required to manage, execute, and deliver technology and sensor capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Sense and Avoid (SAA)-Related Activities	7.920	6.158	8.833
<b>Description:</b> Conduct risk reduction and prototyping activities to improve affordability, reduce cost, schedule and technical risk entering next milestone.			
Received Joint Staff approval of Information Systems CDD requirements. C-ABSAA uses an iterative and incremental approach to develop, test and implement high quality software in a cost effective and timely manner. The software utilizes Open System Architecture (OSA) principles, COTS, Application Programming Interfaces (APIs), and maximum software and interface module independence.			
<b>FY 2020 Plans:</b>			
- Continue C-ABSAA Technology Maturation & Risk Reduction Phase			
- Prepare/present all documentation/results as part of upcoming C-ABSAA Milestone A			
- Work toward Milestone B			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604257F / <i>Advanced Technology and Sensors</i>	<b>Project (Number/Name)</b> 645148 / <i>Common Airborne Sense and Avoid (C-ABSAA)</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>- Continue to collaborate with FAA, NASA, and other Services and agencies on national policy and standards</li> <li>- Continue development/test/certification of open modular architecture processes, standards and design</li> <li>- Begin technical data package generation</li> </ul> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will reach completion of RPA sense and avoid (C-ABSAA) Technology Maturation &amp; Risk Reduction phase</li> <li>- Will generate and complete technical data package</li> <li>- Will reach Milestone B and award EMD contract</li> <li>- Will collaborate with FAA, NASA, and other Services and agencies on national policy and standards</li> <li>- Will develop, test, and certify within C-ABSAA Systems Integration Lab open modular architecture processes, standards and design</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased due to continued TMRR efforts and technical data package preparation, and award of EMD contract.</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		7.920	6.158	8.833
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
Contract will be competitively awarded.				

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Air Force</b>													<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604257F / <i>Advanced Technology and Sensors</i>					<b>Project (Number/Name)</b> 645148 / <i>Common Airborne Sense and Avoid (C-ABSAA)</i>					
<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
C-ABSAA Technology Development	C/Various	Various : Various	-	6.297	Feb 2019	4.678	Oct 2019	7.046	Nov 2020	-		7.046	Continuing	Continuing	-
<b>Subtotal</b>			-	6.297		4.678		7.046		-		7.046	Continuing	Continuing	N/A
<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Program Management Administration (PMA)	Various	Various : Various	-	1.623	Feb 2019	1.480	Oct 2019	1.787	Oct 2020	-		1.787	Continuing	Continuing	-
<b>Subtotal</b>			-	1.623		1.480		1.787		-		1.787	Continuing	Continuing	N/A
			<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>				
<b>Project Cost Totals</b>			-	7.920	6.158	8.833	-	8.833	Continuing	Continuing	N/A				
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604257F / <i>Advanced Technology and Sensors</i>	<b>Project (Number/Name)</b> 645148 / <i>Common Airborne Sense and Avoid (C-ABSAA)</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Common-Airborne Sense and Avoid</i></b>	
Information Systems Capability Development Document	
Milestone A (Jan 2020)	
Technology Maturation and Risk Reduction	
Technical Data Package	
Milestone B (Sep 2021)	
Engineering and Manufacturing Development	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604257F / <i>Advanced Technology and Sensors</i>	<b>Project (Number/Name)</b> 645148 / <i>Common Airborne Sense and Avoid (C-ABSAA)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Common-Airborne Sense and Avoid</i></b>				
Information Systems Capability Development Document	1	2019	3	2019
Milestone A (Jan 2020)	2	2020	2	2020
Technology Maturation and Risk Reduction	2	2020	4	2021
Technical Data Package	1	2020	2	2021
Milestone B (Sep 2021)	4	2021	4	2021
Engineering and Manufacturing Development	4	2021	4	2024



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604288F / <i>National Airborne Ops Center (NAOC) Recap</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	7.168	12.669	76.417	0.000	76.417	136.477	137.749	140.727	143.317	Continuing	Continuing
646507: <i>NAOC Recap Development</i>	-	7.168	12.669	76.417	0.000	76.417	136.477	137.749	140.727	143.317	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
In FY2018, PE 0302015F, E-4B National Airborne Operations Center (NAOC) Project 674777, E-4B Aircraft Modernization efforts were transferred to PE 0604288F, National Airborne Ops Center (NAOC) Recap, Project 646507, NAOC Recap Development, in order to provide greater transparency and consolidate efforts. FY18 funding for NAOC Recap development was \$6.14M.

**A. Mission Description and Budget Item Justification**

The E-4B National Airborne Operations Center (NAOC) is a survivable node of the National Military Command System (NMCS), providing POTUS, SECDEF and the CJCS a worldwide, survivable, and enduring node of the NMCS to fulfill national security requirements throughout all stages of conflict. As a command, control and communications center directing US forces, executing emergency war orders and coordinating the activities of civil authorities including national contingency plans, this capability ensures continuity of operations plans and continuity of government as required in a national emergency or after negation/destruction of ground command and control centers.

The E-4B NAOC Recapitalization effort will replace the aging E-4B fleet which faces capability gaps, diminishing manufacturing sources, increased maintenance costs, and parts obsolescence as it approaches the end of its serviceable life. The recapitalization effort will be informed by Air Force and Department of Defense analyses used to determine a holistic approach to replacing the aging E-4B fleet and integrating its capabilities with other nuclear and national command and control mission sets.

In 2015, the Joint Staff completed a Mission Area Analysis (MAA) focused on the Nuclear Command, Control and Communication (NC3) National Military Command system (NMCS) airborne fleets. This analysis examined alternative architectures and CONOPS for achieving requirements, and suggested potential programmatic, platform, and/or mission system synergies across and between fleet recapitalization programs (E-4B, E-6B, VC-25, C-32A). Further, the Joint Staff documented the essential functions necessary to execute Nuclear Command and Control, and defined the operational role of the NC2 enterprise out to 2030 in a NC2 CONOPS.

From 2014-2016, the Joint Staff performed an NC2 Capabilities Based Assessment (CBA) to determine potential gaps in the NC2 mission and architecture. The findings of these studies have culminated in an evolved NMCS "aerial layer mission alignment strategy" that may allow the Department of Defense (DoD) to consolidate the airborne command center capabilities provided by the E-4B and E-6B into an optimized fleet of appropriately configured aircraft. This concept is known as the Survivable Airborne Operations Center, or SAOC. To this end, beginning in FY2019, OSD CAPE initiated a joint service Analysis of Alternatives (AoA) to assess mission sets and platforms across E-4B (NAOC), C-32A (Executive Airlift), and the Navy's E-6B (ABNCP/TACAMO), known as the "NEAT" AoA.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604288F / <i>National Airborne Ops Center (NAOC) Recap</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver NAOC Recap weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

Furthermore, program funds include support funding for emerging requirements to support program office operations, management services (FFRDC, A&AS, etc.), PMS, security, prototyping, equipment and other as required to stand up a program office. Finally, it includes all activities required to award and execute design and prototyping contracts to either a single or multiple vendors; to include provisioning for follow on efforts, such as long lead materials for following activities and options.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	7.440	16.669	102.739	0.000	102.739
Current President's Budget	7.168	12.669	76.417	0.000	76.417
Total Adjustments	-0.272	-4.000	-26.322	0.000	-26.322
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-4.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.272	0.000			
• Other Adjustments	0.000	0.000	-26.322	0.000	-26.322

**Change Summary Explanation**

FY19 - \$0.272M Small Business Innovative Research (FY19)  
 FY20 - \$4.000M Congressionally Directed Reduction  
 FY21 - \$26.322M Internal Air Force Reduction

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> E-4B NAOC Recap	7.168	12.669	76.417
<b>Description:</b> Efforts will involve early acquisition activities, to include but not limited to, preparation for an acquisition entry decision, completion of the Analysis of Alternatives (AoA), development of initial requirements/acquisition strategy, risk reduction activities, and other efforts necessary to initiate an acquisition program.			
<b>FY 2020 Plans:</b>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604288F / <i>National Airborne Ops Center (NAOC) Recap</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Complete AoA, continue Materiel Solution Analysis activities, and ensure program office is prepared to execute a follow on acquisition program. Support Air Force Global Strike Command (AFGSC) with generating a Capabilities Development Document (CDD) and develop a System Requirements Document (SRD). Complete required documents and activities necessary to issue a Request for Proposal (RFP) to begin recapitalization of the E-4B platform. Issue solicitation to industry for the award of up to two contracts as part of phase one of a two phased down-select acquisition strategy. Increase program office staffing sufficiently to execute two pre-EMD risk reduction contracts to be awarded in FY21.</p> <p><b><i>FY 2021 Plans:</i></b> Award competitive contracts to industry focused on pre-Engineering &amp; Manufacturing Development (EMD) type activities that may include, but not limited to: government/industry collaboration on the generation of SRD level requirements for the complete weapons system; a prototype Mission Systems Laboratory; risk reduction studies/activities (for example: Layout of Passenger Accommodations (LOPA) analysis; avionics; in-flight Auxiliary Power Unit (APU) or power generation development; advanced communications systems; Electromagnetic Pulse (EMP) hardening on composite structures; Size, Weight, and Power Cooling (SWaP-C) analysis; co-site assessments; etc.); Preliminary Design Reviews (PDR) of each of the winning vendor's designs. FY21 will also continue the program office growth-path required to support the execution of a future Acquisition Category (ACAT) I-level effort.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> FY21 continues program office stand-up and further increases pre EMD planning efforts in the form of pre EMD studies and/or prototyping with industry, requirements preparation, as well as acquisition strategy and request for proposal development.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	7.168	12.669	76.417

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
The E-4B Recapitalization program is currently completing the Materiel Solution Analysis phase and the Analysis of Alternatives. In parallel with these efforts, a formal acquisition strategy is being developed. Initial courses of action under consideration include a streamlined acquisition approach, maximizing the use of competition with a potential award of multiple contracts to industry.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 4				PE 0604288F / National Airborne Ops Center (NAOC) Recap				646507 / NAOC Recap Development								
<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Product Development	C/CPAF	TBD : TBD	-	-		-		-		-		-	Continuing	Continuing	-	
Pre-EMD Studies and Activities	TBD	TBD : TBD	-	-		3.422	Jun 2020	57.134	Feb 2021	-		57.134	Continuing	Continuing	-	
<b>Subtotal</b>			-	-		3.422		57.134		-		57.134	Continuing	Continuing	N/A	
<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Support	C/CPAF	Various : Bedford, MA : TBD	-	1.408	Oct 2018	0.569	Feb 2020	0.231	Oct 2020	-		0.231	Continuing	Continuing	-	
<b>Subtotal</b>			-	1.408		0.569		0.231		-		0.231	Continuing	Continuing	N/A	
<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
FFRDC	Various	Various : Bedford, MA : Hanscom AFB, MA	-	2.011	Oct 2018	5.580	Oct 2019	9.424	Oct 2020	-		9.424	Continuing	Continuing	-	
EPASS (A&AS)	Various	Various : Bedford, MA : Hanscom AFB, MA	-	2.706	Nov 2018	2.063	Nov 2019	8.702	Oct 2020	-		8.702	Continuing	Continuing	-	
PMA - Other	Various	Various : Bedford, MA : Hanscom AFB, MA	-	1.043	Oct 2018	1.035	Jul 2020	0.926	Oct 2020	-		0.926	Continuing	Continuing	-	
<b>Subtotal</b>			-	5.760		8.678		19.052		-		19.052	Continuing	Continuing	N/A	
<b>Project Cost Totals</b>			-	7.168		12.669		76.417		-		76.417	Continuing	Continuing	N/A	

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Air Force							<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 3600 / 4			<b>R-1 Program Element (Number/Name)</b> PE 0604288F / <i>National Airborne Ops Center (NAOC) Recap</i>			<b>Project (Number/Name)</b> 646507 / <i>NAOC Recap Development</i>				
	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	

**Remarks**  
 Costs associated with development planning, risk reduction and preliminary planning activities including systems engineering strategy and analysis; completion and reporting of the Analysis of Alternatives.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604288F / <i>National Airborne Ops Center (NAOC) Recap</i>	<b>Project (Number/Name)</b> 646507 / <i>NAOC Recap Development</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>NAOC Recap Development</b>	
Analysis of Alternatives	
Material Solution Analysis	
Acquisition Strategy Development	
Pre-EMD Studies, Activities & Prototyping	
Milestone B	
EMD	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604288F / <i>National Airborne Ops Center (NAOC) Recap</i>	<b>Project (Number/Name)</b> 646507 / <i>NAOC Recap Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>NAOC Recap Development</i></b>				
Analysis of Alternatives	1	2019	3	2020
Materiel Solution Analysis	1	2019	4	2020
Acquisition Strategy Development	3	2019	4	2020
Pre-EMD Studies, Activities & Prototyping	3	2020	2	2023
Milestone B	2	2023	2	2023
EMD	2	2023	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604317F / <i>Technology Transfer</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	18.754	37.614	3.011	0.000	3.011	3.218	3.266	3.324	3.385	Continuing	Continuing
646003: <i>Partnership Intermediary Agreement(s)</i>	-	6.763	17.096	3.011	0.000	3.011	3.218	3.266	3.324	3.385	Continuing	Continuing
646030: <i>AFwerX</i>	-	11.991	20.518	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	32.509

**A. Mission Description and Budget Item Justification**

The Technology Transfer Program captures and manages all intellectual property (patents and inventions) developed by the Air Force and leads efforts to transfer the intellectual property to commercial sector for the production and transition of the technology to the warfighter.

TechLink, Department of Defense's (DoD)'s first National level Partnership Intermediary, directly supports these activities for all Air Force, Army, Navy, and independent DoD Research Laboratories. TechLink brokers technology transfer agreements between DoD laboratories and US industry for the manufacture and use of DoD inventions. These agreements enable DoD to leverage the investment and capabilities of the private-sector in development of new defense-related products and services, lowering DoD costs and also helping ensure that DoD-developed or co-developed technologies are transitioned to DoD operational use. This program impacts virtually all technology fields, including medicine, software, electronics, communications, advanced materials, and energy-related technologies.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Technology Transfer capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

In FY 2021, all efforts and civilian manpower under Project 646030, AFWERX, will be transferred to the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), Administration and Service-wide Activities, for proper execution of AFWERX activities.

The FY 2021 funding request was reduced by \$0.130 million to account for availability of prior year execution balances.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604317F / <i>Technology Transfer</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	16.924	23.614	13.662	0.000	13.662
Current President's Budget	18.754	37.614	3.011	0.000	3.011
Total Adjustments	1.830	14.000	-10.651	0.000	-10.651
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	14.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	2.450	0.000			
• SBIR/STTR Transfer	-0.620	0.000			
• Other Adjustments	0.000	0.000	-10.651	0.000	-10.651

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 646003: *Partnership Intermediary Agreement(s)*

Congressional Add: *Program Increase - technology partnerships*

Congressional Add: *Program increase - academic partnership intermediary agreement tech transfer*

Congressional Add Subtotals for Project: 646003

Congressional Add Totals for all Projects

	<b>FY 2019</b>	<b>FY 2020</b>
	3.854	4.000
	0.000	10.000
	3.854	14.000
	3.854	14.000

**Change Summary Explanation**

1) Increase in FY 2019 of \$2.450 million due to reprogramming for AFWERX product development.

2) Decrease in FY 2021 of \$10.651 million due to all efforts and civilian manpower under Project 646030, AFWERX, being transferred to the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), Administration and Service-wide Activities, for proper execution of AFWERX activities and to account for availability of prior year execution balances and Department of Defense inflationary factors.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604317F / <i>Technology Transfer</i>				<b>Project (Number/Name)</b> 646003 / <i>Partnership Intermediary Agreement(s)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
646003: <i>Partnership Intermediary Agreement(s)</i>	-	6.763	17.096	3.011	0.000	3.011	3.218	3.266	3.324	3.385	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This project accomplishes the following: (1) establish license agreements to transfer patented inventions from Department of Defense (DoD) research laboratories to industry for conversion into new dual-use products and services to support DoD's defense mission and benefit the US economy; and (2) establish collaborative research and development agreements (CRADAs) with the private-sector for development of new, innovative, dual-use technology. Both of these activities enable DoD to leverage the investment and capabilities of the private-sector in development of new defense-related products and services, lowering DoD costs and also helping ensure that DoD-developed or co-developed technologies are transitioned to DoD operational use.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Technology Transfer	2.909	3.096	3.011
<b>Description:</b> Enhance and expand transfer of technologies between DoD and the commercial sector.			
<b>FY 2020 Plans:</b> Continue to implement new cost-effective approaches to further increase and accelerate transfer of technologies developed at DoD laboratories and facilitate their transition to the warfighter. Evaluate and market DoD laboratory inventions and broker technology transfer agreements/CRADAs, to include commercial licenses, that will support the US defense mission and benefit the US economy. Engage the innovative capabilities of non-traditional defense contractors in developing and commercializing new dual-use products and services.			
<b>FY 2021 Plans:</b> Evaluate and market DoD laboratory inventions and broker license and other technology transfer agreements/ CRADAs between DoD research labs and U.S. companies to support the U.S. defense mission and benefit the U.S. economy. Implement new cost-effective approaches to increase and accelerate transfer of DoD lab technologies and facilitate their transition to DoD operational use. This effort will focus primarily on the non-traditional defense industrial base and is intended to leverage the innovativeness, resources, and capabilities of the private-sector in developing and commercializing new dual-use products and services.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 decreased compared to FY 2020 by \$0.085 million due to Department of Defense inflationary factors.			
<b>Accomplishments/Planned Programs Subtotals</b>	2.909	3.096	3.011

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604317F / <i>Technology Transfer</i>	<b>Project (Number/Name)</b> 646003 / <i>Partnership Intermediary Agreement(s)</i>
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	FY 2019	FY 2020
<b>Congressional Add:</b> Program Increase - technology partnerships <b>FY 2019 Accomplishments:</b> Conducted Congressionally directed efforts. <b>FY 2020 Plans:</b> Conduct Congressionally directed efforts.	3.854	4.000
<b>Congressional Add:</b> Program increase - academic partnership intermediary agreement tech transfer <b>FY 2019 Accomplishments:</b> Not applicable. <b>FY 2020 Plans:</b> Conduct Congressionally directed efforts.	0.000	10.000
<b>Congressional Adds Subtotals</b>	3.854	14.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

N/A

**D. Acquisition Strategy**

This effort uses a Partnership Intermediary Agreement (PIA) with TechLink at Montana State University. Through this agreement TechLink helps the Department of Defense to establish licensing and other technology transfer agreements with US industry. The effort is run through the Air Force Research Laboratory/Small Business office at Wright Patterson Air Force Base.

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**Exhibit R-3, RDT&E Project Cost Analysis:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604317F / <i>Technology Transfer</i>	<b>Project (Number/Name)</b> 646003 / <i>Partnership Intermediary Agreement(s)</i>
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
License DoD inventions for conversion into new products and services	PO	TechLink : Bozeman, MT	-	2.909	Jan 2019	3.096	Jan 2020	3.011		-		3.011	Continuing	Continuing	-
Congressional Add - technology partnerships	PO	TechLink : Bozeman, MT	-	3.854	Apr 2019	4.000	Apr 2020	0.000		-		0.000	0.000	7.854	-
Congressional Add - academic partnership intermediary agreement tech transfer	PO	TechLink : Bozeman, MT	-	0.000		10.000	Apr 2020	0.000		-		0.000	0.000	10.000	-
<b>Subtotal</b>			-	6.763		17.096		3.011		-		3.011	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	6.763	17.096	3.011	-	3.011	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604317F / <i>Technology Transfer</i>	<b>Project (Number/Name)</b> 646003 / <i>Partnership Intermediary Agreement(s)</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Partnership Intermediary</i></b>	
Tech Transfer Partnership Intermediary	
Congressional Add - technology partnerships	
Congressional Add - academic partnership intermediary agreement tech transfer	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604317F / <i>Technology Transfer</i>	<b>Project (Number/Name)</b> 646003 / <i>Partnership Intermediary Agreement(s)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Partnership Intermediary</i></b>				
Tech Transfer Partnership Intermediary	1	2019	4	2025
Congressional Add - technology partnerships	1	2019	4	2020
Congressional Add - academic partnership intermediary agreement tech transfer	1	2020	4	2020

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604317F / <i>Technology Transfer</i>				<b>Project (Number/Name)</b> 646030 / <i>AFwerX</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
646030: <i>AFwerX</i>	-	11.991	20.518	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	32.509
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This project improves Air Force capabilities by connecting innovators, simplifying technology transfer, and accelerating results. AFWERX will accomplish this mission by: (1) Connecting diverse, innovative members from industry, academia, and government; (2) Creating capabilities options and prototype opportunities for the Air Force; (3) Facilitating streamlined acquisition processes; and (4) Fostering a culture of innovation in the Air Force.

In FY 2021, all efforts and civilian manpower under Project 646030, AFWERX, will be transferred to the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), Administration and Service-wide Activities, for proper execution of AFWERX activities.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> AFWERX	11.991	19.925	0.000
<b>Description:</b> Connect diverse, innovative members from industry, academia, and government to create capabilities options and prototype opportunities for the Air Force.			
<b>FY 2020 Plans:</b> Host additional innovative competitions to support warfighter needs at the DC, Las Vegas, and Austin Innovation hubs. Increase collaboration with government innovative centers, academia, think tanks, and industry through technology accelerator programs. Utilize additional virtual collaboration tools and analytics. Additional AFWEX Innovation Hub locations may be added as directed by Air Force Senior Leadership.			
<b>FY 2021 Plans:</b> In FY 2021, the entirety of this effort will be transferred to the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), Administration and Service-wide Activities, for proper execution of AFWERX activities.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 decreased compared to FY 2020 by \$19.925 million. Funding decreased due to the transfer of AFWERX activities to the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), Administration and Service-wide Activities for proper execution.			
<b>Title:</b> AFWERX Acquisition Support	0.000	0.593	0.000
<b>Description:</b> Provide professional government civilian workforce in support of AFWERX programs and activities.			
<b>FY 2020 Plans:</b>			



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604317F / <i>Technology Transfer</i>	<b>Project (Number/Name)</b> 646030 / <i>AFwerX</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
Continue to provide professional government civilian workforce in support of all AFWERX programs and activities. This includes three government civilians with average work year costs of \$0.197 million.			
<b><i>FY 2021 Plans:</i></b> In FY 2021, civilian manpower to support AFWERX activities will be transferred to the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), Administration and Service-wide Activities, for proper execution.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> FY 2021 decreased compared to FY 2020 by \$0.593 million. Funding decreased due to the transfer of all AFWERX civilian manpower to the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), Administration and Service-wide Activities, for proper execution.			
<b>Accomplishments/Planned Programs Subtotals</b>	11.991	20.518	0.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The District of Columbia (DC) Innovation Hub and the Las Vegas Innovation Hub are contracted under existing Air Force Research Laboratory (AFRL) Partnership Intermediary Agreements (PIAs) awarded to Virginia Tech Applied Research Corporation and the DefenseWerx.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604317F / <i>Technology Transfer</i>	<b>Project (Number/Name)</b> 646030 / <i>AFWERX</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Las Vegas Innovation Hub	PO	DefenseWerx : Ft Walton Beach, FL	-	4.900	Jan 2019	8.300	Jan 2020	0.000		-		0.000	0.000	13.200	-
District of Columbia (DC) Innovation Hub	PO	VA Tech Applied Res Corp : Arlington, VA	-	4.750	Jan 2019	5.525	Jan 2020	0.000		-		0.000	0.000	10.275	-
Austin Innovation Hub	MIPR	Capital-Factory : Austin, TX	-	0.275	Jan 2019	0.500	Jan 2020	0.000		-		0.000	0.000	0.775	-
Product Development and Tools	Various	All AFWERX locations : TBD	-	2.066	Sep 2019	5.600	Jan 2020	0.000		-		0.000	0.000	7.666	-
<b>Subtotal</b>			-	11.991		19.925		0.000		-		0.000	0.000	31.916	N/A

**Remarks**  
In FY 2021, the entirety of work and civilian manpower under Project 646030, AFWERX, will be transferred to the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), Administration and Service-wide Activities, for proper execution of AFWERX activities.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Acquisition workforce	Allot	HQ Air Force : Arlington, VA	-	0.000		0.593	Oct 2019	0.000		-		0.000	0.000	0.593	-
<b>Subtotal</b>			-	0.000		0.593		0.000		-		0.000	0.000	0.593	N/A

**Remarks**  
In FY 2021, the entirety of work and civilian manpower under Project 646030, AFWERX, will be transferred to the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), Administration and Service-wide Activities, for proper execution of AFWERX activities.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		-	11.991	20.518	0.000	-	0.000	0.000	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604317F / <i>Technology Transfer</i>	<b>Project (Number/Name)</b> 646030 / <i>AFwerX</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>AFwerX</i>	
AFwerX	[REDACTED]

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604317F / <i>Technology Transfer</i>	<b>Project (Number/Name)</b> 646030 / <i>AFwerX</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>AFwerX</i></b>				
<i>AFwerX</i>	1	2019	4	2020

**Note**

In FY 2021, the entirety of work and civilian manpower under Project 646030, AFWERX, will be transferred to the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), Administration and Service-wide Activities, for proper execution of AFWERX activities.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604327F I <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	41.259	113.121	52.921	0.000	52.921	16.974	0.000	0.000	0.000	0.000	224.275
645341: <i>Direct Strike Penetrator Systems</i>	0.000	41.259	113.121	52.921	0.000	52.921	16.974	0.000	0.000	0.000	0.000	224.275
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Direct Strike Penetrator Systems program develops and modifies a family of advanced precision-guided penetrator munitions to include evaluation of integrated technologies for the development/integration of advanced position, navigation, and timing (PNT) capabilities (i.e., Global Positioning System (GPS), non-GPS, optical, passive, active, etc.) and smart fuze systems, and all penetrator components, that will provide the Air Force with improved ability to attack Hard and Deeply Buried Targets (HDBT), such as bunker and tunnel facilities, using air-to-surface conventional munitions. Systems developed include, but are not limited to Massive Ordnance Penetrator (MOP), Advanced 5,000-lb Penetrator Weapon System (A5K), and Section 804 Rapid Prototype/Rapid Fielding activities. Systems developed will be integrated onto current and future platforms to reduce the number of weapons required to hold HDBTs at risk and will result in more targets engaged per mission flown. Direct Strike Penetrators will provide critical global strike capability not met by inventory conventional weapons and will hold at risk the best protected high value assets essential to an enemy's war fighting ability. The project also provides an opportunity to quickly insert emerging technologies into existing and developing aircraft munitions and fuzes.

A Hard Target Munitions (HTM) Analysis-of-Alternatives (AoA) was conducted in 2014 to determine the best weapons and/or development efforts for addressing the HDBT mission area. The HTM AoA determined that it was necessary to develop a family of HTMs in order to apply effects to the entire range of HDBT sets. The Air Force is using the AoA to develop, produce and modify HDBT weapons identified as the most effective and affordable. Modeling and simulation is used to assess and characterize current inventory and, to drive design and explore the utility of new classes of penetrator munitions.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Direct Strike Penetrator Systems and M-code weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0604327F I Hard and Deeply Buried Target Defeat System (HDBTDS) Program
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	36.701	113.121	0.000	0.000	0.000
Current President's Budget	41.259	113.121	52.921	0.000	52.921
Total Adjustments	4.558	0.000	52.921	0.000	52.921
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	5.700	0.000			
• SBIR/STTR Transfer	-1.142	0.000			
• Other Adjustments	0.000	0.000	52.921	0.000	52.921

**Change Summary Explanation**

FY 2019 \$1.142M was decreased due to Small Business Innovation Research

FY 2019 \$5.700M was increased due to BTR for MOP Modification

FY 2021 increase for MOP Smart Fuze Testing

**C. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Massive Ordnance Penetrator (MOP) Modification	5.700	77.000	50.771	0.000	50.771
<b>Description:</b> Modify the Massive Ordnance Penetrator (MOP) weapon for enhanced capability to hold additional Hard and Deeply Buried Targets at risk in multiple Combatant Commands (COCOMs). The modification will be primarily software-based and the existing inventory of Guided Bomb Unit (GBU)-57E/B will be retrofitted. Construct relevant hard and deeply buried targets for testing. Execute MOP testing in support of modification efforts to included sub-scale and full-scale ground and flight tests. Analyze MOP weapon effectiveness.					
<b>FY 2020 Plans:</b> Continue testing and evaluating integration of MOP Modification for enhanced capability. Evaluate and analyze designs and prototype concepts for expanded aircraft employment.					
<b>FY 2021 Base Plans:</b> Continue testing and evaluating integration of MOP Modification for enhanced capability. Build long-lead targets and accomplish flight tests for expanded aircraft employment.					
<b>FY 2021 OCO Plans:</b>					

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force				<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)		<b>R-1 Program Element (Number/Name)</b> PE 0604327F I Hard and Deeply Buried Target Defeat System (HDBTDS) Program				
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>						
		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
N/A						
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased in coordination with program test activities.						
<b>Title:</b> Advanced 5,000 lb (A5K) Penetrator		31.010	36.121	0.000	0.000	0.000
<b>Description:</b> Advanced 5,000 lb (A5K) Penetrator is an improved 5,000 lb class penetrator to address capability gaps identified in the HTM AoA. Conduct A5K design, development, integration, modeling and simulation, and testing to improve performance against increasingly hardened targets. This effort utilizes existing and improved technologies to field an integrated penetrator weapon system to include: an improved penetrator warhead, a smart fuze system that can detect layers/voids, and a modified Joint Direct Attack Munition (JDAM) tail kit for all weather, precision guidance, navigation, and control. The program has completed the Preliminary Design Review and has moved into prototype production, integration and testing.						
<b>FY 2020 Plans:</b> Finalize A5K prototype design and complete full scale sled testing. Continue prototype production, integration and qualification testing, and conduct flight testing against operationally representative targets to verify system performance against the prioritized HTM AoA target set.						
<b>FY 2021 Base Plans:</b> N/A						
<b>FY 2021 OCO Plans:</b> N/A						
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased in coordination with program activities.						
<b>Title:</b> Military Code (M-Code) and Enhanced Anti-Jam (EAJ)		4.549	0.000	2.150	0.000	2.150
<b>Description:</b> M-Code and EAJ provides the capability to operate in increasing adversarial anti-access/area denial (A2/AD) jamming environments. M-Code and EAJ also provide increased accuracy, better signal acquisition, and advanced security.						
<b>FY 2020 Plans:</b>						

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0604327F I Hard and Deeply Buried Target Defeat System (HDBTDS) Program
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A					
<b>FY 2021 Base Plans:</b> Continue developing M-Code integration into MOP weapon system.					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased due to continuation of development work.					
<b>Accomplishments/Planned Programs Subtotals</b>	41.259	113.121	52.921	0.000	52.921

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• PAAF 01 353190: Massive Ordnance Penetrator (MOP)	34.711	-	-	-	-	-	-	-	-	0.000	34.711
• RDTE 05 0604602F: Armament/ Ordnance Development	34.788	28.043	23.076	-	23.076	9.183	6.705	6.825	6.950	Continuing	Continuing
• RDTE 05 0604618F: Joint Direct Attack Munition	-	-	7.926	-	7.926	-	-	-	-	0.000	7.926
• RDTE 04 0604201F: PNT Resiliency	86.445	124.600	-	-	-	-	-	-	-	0.000	211.045

**Remarks**

**E. Acquisition Strategy**  
MOP uses sole source cost type contracts to complete development, test, and evaluation activities.

M-Code/EAJ effort uses a Family of Systems approach where the three prime weapons contractors develop receivers capable of operating in any of their AF weapons. The receivers are based on a common, internally-developed interface requirements specification, technology requirement document, and threat scenario. This approach uses a combination of contract types based on acquisition phase (Technology Maturation and Risk Reduction, Development, Production) and risk. The Weapons System Program Offices share a common development program element to allow flexibility in funding and planning, switching to individual PEs for receiver integration, operational test, and production. The M-Code/EAJ Weapons Receiver Development effort leverages technology currently under development by the GPS-Directorate Military GPS User Equipment program and will provide the warfighter with unmatched capability to operate in future A2/AD environments.



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	PE 0604327F <i>I Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>

The initial A5K design was accomplished through modeling, simulation, and analysis producing potential designs. The designs were developed based on the performance parameters of survivability, lethality, accuracy and penetration. Upon completion of the modeling, simulation, and analysis of the A5K prototype designs a government review will determine the optimum A5K design going forward. That design will be used to fabricate test articles to include warheads, fuzing, and modified JDAM tail kits. These assets will be used to conduct and successfully complete qualification testing.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>	<b>Project (Number/Name)</b> 645341 / <i>Direct Strike Penetrator Systems</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MOP Modification and Integration	SS/ Various	Boeing : St Louis, MO	0.000	-		14.727	Feb 2020	24.266	Feb 2021	-		24.266	3.000	41.993	-
M-Code/EAJ Receiver	SS/CPAF	Various : TBD	0.000	4.549	May 2019	-		2.150	Jan 2021	-		2.150	0.000	6.699	-
A5K Warhead Design/Components & Cases	MIPR	DOTC/ARA : Albuquerque, NM	0.000	10.642	Jan 2019	2.480	Oct 2019	-		-		-	0.000	13.122	-
A5K Guidance (JDAM)	SS/ Various	Boeing : St Louis, MO	0.000	9.169	Apr 2019	3.840	Dec 2019	-		-		-	0.000	13.009	-
A5K Embedded Fuze	MIPR	DOTC/ARA/NGIS : Albuquerque, NM	0.000	5.857	Jan 2019	6.803	Oct 2019	-		-		-	0.000	12.660	-
<b>Subtotal</b>			0.000	30.217		27.850		26.416		-		26.416	3.000	87.483	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MOP Govt Support	Various	Various : Eglin AFB, FL	0.000	-		3.688	Feb 2020	2.006	Feb 2021	-		2.006	1.250	6.944	-
A5K System T&E Contractor Support	MIPR	DOTC/ARA/NGIS : Albuquerque, NM	0.000	1.800	Jan 2019	4.316	Oct 2019	-		-		-	0.000	6.116	-
A5K System T&E Government Support	MIPR	MCAAP : McAlester, OK	0.000	1.070	Apr 2019	0.622	May 2020	-		-		-	0.000	1.692	-
<b>Subtotal</b>			0.000	2.870		8.626		2.006		-		2.006	1.250	14.752	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MOP Test & Evaluation	Various	AFLCMC : Eglin, Holloman, Edw, FL	0.000	5.695	Aug 2019	30.282	Jan 2020	22.536	Jan 2021	-		22.536	3.630	62.143	-
MOP Target Construction and Instrumentation	Various	DTRA : Albuquerque, NM	0.000	-		28.210	Nov 2019	-		-		-	7.485	35.695	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>	<b>Project (Number/Name)</b> 645341 / <i>Direct Strike Penetrator Systems</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A5K Developmental Test & Evaluation	Various	96 TW, 780 TS : Eglin, Holloman, FL	0.000	2.132	Jul 2019	10.493	Apr 2020	-		-		-	0.000	12.625	-
A5K Operational Test & Evaluation	Various	96 TW, Det 1, DTRA : Eglin, WSMR, FL	0.000	0.280	Mar 2019	6.387	Oct 2019	-		-		-	0.000	6.667	-
<b>Subtotal</b>			0.000	8.107		75.372		22.536		-		22.536	11.115	117.130	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MOP Program Management Administration (PMA)	Various	AFLCMC/EBD : Eglin AFB, FL	0.000	0.005	Jan 2019	0.093	May 2020	1.963	Oct 2020	-		1.963	1.609	3.670	-
A5K Program Management Administration (PMA)	Various	AFLCMC/EBD : Eglin AFB, FL	0.000	0.060	Jan 2019	1.180	Jan 2020	-		-		-	0.000	1.240	-
<b>Subtotal</b>			0.000	0.065		1.273		1.963		-		1.963	1.609	4.910	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		0.000	41.259	113.121	52.921	-	52.921	16.974	224.275	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>	<b>Project (Number/Name)</b> 645341 / <i>Direct Strike Penetrator Systems</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b><i>Direct Strike Penetrator Systems</i></b>																												
MOP Modification Analysis and Testing																												
A5K Design, Development and Testing																												
M-Code/EAJ Development/Integration																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>	<b>Project (Number/Name)</b> 645341 / <i>Direct Strike Penetrator Systems</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Direct Strike Penetrator Systems</i></b>				
MOP Modification Analysis and Testing	1	2019	3	2022
A5K Design, Development and Testing	1	2019	4	2021
M-Code/EAJ Development/Integration	1	2019	2	2021

**Note**

Fielding M-code integration will be funded through the Weapons SPOs individual PEs.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	57.671	56.325	69.783	0.000	69.783	79.688	79.618	76.449	74.347	Continuing	Continuing
642810: <i>Cyber Workforce Development</i>	-	9.986	8.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
642812: <i>Acquisition/System Security Engineering</i>	-	2.746	17.001	31.579	0.000	31.579	34.587	35.279	34.875	33.916	Continuing	Continuing
642816: <i>Agile/Adaptable Standards</i>	-	19.420	7.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
642834: <i>Mitigations</i>	-	23.008	17.036	31.307	0.000	31.307	37.527	36.902	34.583	33.633	Continuing	Continuing
642836: <i>Mission Risk Analysis</i>	-	2.511	6.838	6.897	0.000	6.897	7.574	7.437	6.991	6.798	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

This program funds activities at the Cyber Resiliency Office for Weapon Systems (CROWS), which provides cyber capabilities and acquisition support to weapon system programs across the Air Force. CROWS increases cyber resiliency of Air Force weapon systems to maintain mission effective capability under adverse conditions. Its goals are to bake cyber resiliency into new weapons systems and mitigate critical vulnerabilities in fielded weapon systems.

To meet these goals, this program addresses cyber resiliency and security gaps in three primary activities. The first activity is to develop systems security engineering tools, techniques and procedures as well as associated training and education to build cyber expertise within acquisition workforce, to include developing a common secure environment to enable effective sharing of cyber intelligence and vulnerability information across multiple acquisition programs. It also includes identifying emerging technologies for further development and prototyping to posture Air Force weapon systems to counter emerging threats. The second activity is to conduct threat informed weapon systems solution analysis, identify and prioritize vulnerabilities and identify, develop and present courses of action to develop materiel and non-materiel mitigation trade space. The third activity is to design mitigation strategies and prototype mitigation solutions to critical vulnerabilities, with emphasis on those that affect multiple weapon systems.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver CROWS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

In FY 2021, Project 642812 is renamed from System Security Engineering to Acquisition/System Security Engineering.

In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, and Project 642816, Agile/Adaptable Standards, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

In FY 2021, Project 642834 is renamed from Mission Assurance for Fielded Systems to Mitigations.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>
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In FY 2021, Project 642836 is renamed from Mission Thread Analysis to Mission Risk Analysis.

The FY 2021 funding request was reduced by \$4.622 million to account for availability of prior year execution balances.

As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 826 Penalty for Cost Overruns, the FY 2019 Air Force penalty total is \$50.0M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	62.618	56.325	74.535	0.000	74.535
Current President's Budget	57.671	56.325	69.783	0.000	69.783
Total Adjustments	-4.947	0.000	-4.752	0.000	-4.752
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-3.000	0.000			
• SBIR/STTR Transfer	-1.947	0.000			
• Other Adjustments	0.000	0.000	-4.752	0.000	-4.752

**Change Summary Explanation**

Decrease in FY 2019 of \$3.000 million is due to reprogramming for funding AFLCMC/HNC Information Systems Security Program (ISSP) Trusted System Network (TSN) requirement in PE 0303140F.

Decrease in FY 2021 of \$4.752 million is due to Department of Defense inflationary adjustments and to account for availability of prior year execution balances.



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>				<b>Project (Number/Name)</b> 642810 / <i>Cyber Workforce Development</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
642810: <i>Cyber Workforce Development</i>	-	9.986	8.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Cyber Workforce Development project develops and transitions cyber resiliency training, manning strategies, and deploys teams providing cyber acquisition experts to Program Executive Offices (PEO) to address acquisition workforce gaps in cyber resiliency/security manpower, experience, and knowledge. This project hones workforce expertise and skills required to counter weapon system-unique cyber threats, which exceeds the knowledge needed to secure Internet Protocol (IP) based systems against traditional network-based cyber threats. Such expertise is critical for acquisition professionals to ensure cyber resiliency/security design tenets are integrated into the weapon system life cycle.

In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Increase Acquisition Workforce Cyber Expertise	9.986	8.200	0.000
<b>Description:</b> Increases knowledge and advanced skills of acquisition workforce.			
<b>FY 2020 Plans:</b> Continue to compile threat, weapon system and technology gaps and integrate this information into the Air Force weapon system cyber resiliency training curriculum to reduce enterprise risk. Identify cyber security/resiliency skill gaps in the functional areas of the acquisition workforce. Continue to expand and improve/validate Cyber Focus Team proof-of-concept based on PEO feedback. Execute hiring and retention strategy for skilled weapon system cyber resiliency acquisition professionals.			
<b>FY 2021 Plans:</b> In FY 2021, the work under this effort will be transferred to the Prototype, Evaluate, and Transition System Security Engineering effort under Project 642812, Acquisition/System Security Engineering.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 decreased compared to FY 2020 by \$8.200 million. Funding decreased due to realignment of Increase Acquisition Workforce Cyber Expertise activities to the Prototype, Evaluate, and Transition Systems Security Engineering effort under Project 642812, Acquisition/System Security Engineering.			
<b>Accomplishments/Planned Programs Subtotals</b>	9.986	8.200	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642810 / <i>Cyber Workforce Development</i>

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate. The government agency responsible for managing the program is the Air Force Life Cycle Management Center, Cyber Resiliency Office for Weapons Systems, Wright-Patterson Air Force Base, Ohio and Hanscom Air Force Base, Massachusetts.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642810 / <i>Cyber Workforce Development</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Education and Training (AFRL, AFIT, DAU)	Various	Various : Various	-	5.596	Apr 2019	0.730	Feb 2020	0.000		-		0.000	0.000	6.326	-
<b>Subtotal</b>			-	5.596		0.730		0.000		-		0.000	0.000	6.326	N/A

**Remarks**  
In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MITRE	Various	Various : Bedford, MA	-	0.000	Oct 2018	6.688	Nov 2019	0.000		-		0.000	0.000	6.688	-
SMC Aerospace	Various	Various : El Segundo, CA	-	1.800	Jun 2019	-		-		-		-	0.000	1.800	-
<b>Subtotal</b>			-	1.800		6.688		0.000		-		0.000	0.000	8.488	N/A

**Remarks**  
In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS, Travel, Government Purchase Card	Various	Various : Various	-	2.590	Apr 2019	0.782	Nov 2019	0.000		-		0.000	0.000	3.372	-
<b>Subtotal</b>			-	2.590		0.782		0.000		-		0.000	0.000	3.372	N/A

**Remarks**  
In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Air Force</b>							<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 3600 / 4			<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>				<b>Project (Number/Name)</b> 642810 / <i>Cyber Workforce Development</i>				
	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>		
<b>Project Cost Totals</b>	-	9.986	8.200	0.000	-	0.000	0.000	18.186	N/A		

**Remarks**  
 In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642810 / <i>Cyber Workforce Development</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b><i>Cyber Workforce Development</i></b>																												
Deploy Cyber Resiliency Support Team																												
Deploy Cyber Focus Teams																												
Develop basic weapon system cyber awareness training																												
Develop advanced weapon system cyber training																												
Hire/retain cyber security professionals																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642810 / <i>Cyber Workforce Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Cyber Workforce Development</i></b>				
Deploy Cyber Resiliency Support Team	1	2019	4	2019
Deploy Cyber Focus Teams	3	2019	4	2020
Develop basic weapon system cyber awareness training	1	2019	4	2020
Develop advanced weapon system cyber training	1	2019	4	2020
Hire/retain cyber security professionals	1	2019	4	2020

**Note**

In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>				<b>Project (Number/Name)</b> 642812 / <i>Acquisition/System Security Engineering</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
642812: <i>Acquisition/System Security Engineering</i>	-	2.746	17.001	31.579	0.000	31.579	34.587	35.279	34.875	33.916	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Acquisition/System Security Engineering activity develops Air Force and Department of Defense system security engineering and acquisition security processes, policies, and contracting language, and refines intelligence collection and processes to provide actionable information on cyber threats to the weapons system community. This activity bolsters Air Force cyber resiliency/security by developing common secure environments for Program Offices to share information on classified weapon system cyber intelligence, threats, and vulnerabilities. It also encompasses developing cyber resiliency training, manning strategies, and Cyber Focus Teams, which provide cyber acquisition expertise to Program Executive Offices (PEO) to address acquisition workforce gaps in cyber resiliency/security manpower, experience, and knowledge. This project hones workforce expertise and skills required to counter weapon system-unique cyber threats, which exceeds the knowledge needed to secure Internet Protocol (IP) based systems against traditional network-based cyber threats. Such expertise is critical for acquisition professionals to ensure cyber resiliency/security design tenets are integrated into the weapon system life cycle. Finally, this project includes identification, evaluation, and prioritization of emerging cyber techniques, products, and technologies for further development and prototyping to posture Air Force weapon systems to counter emerging threats. This activity supports Air Force Program Offices, the Protecting Critical Technologies Task Force, Defense Industrial Base data protection efforts, Air Force Supply Chain Risk Management, and other weapon system cyber security/resiliency activities as required.

In FY 2021, Project 642812 is renamed from System Security Engineering to Acquisition/System Security Engineering.

In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, and Project 642816, Agile/Adaptable Standards, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Prototype, Evaluate, and Transition System Security Engineering	2.746	17.001	31.579
<b>Description:</b> Prototypes, evaluates, and transitions cyber security and resiliency activities into policy, processes, products, and people.			
<b>FY 2020 Plans:</b> Continue prototyping a common cyber security environment for sharing of cyber information across Air Force weapon systems. Continue to refine and execute intelligence collection/analysis to identify cyber threats and cyber posture for specific weapon			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642812 / <i>Acquisition/System Security Engineering</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
<p>systems. Deliver next iteration of product prototypes, tools, policy and processes to integrate cyber resiliency/security in all phases and activities of weapons system acquisition.</p> <p><b><i>FY 2021 Plans:</i></b> Continue to evolve the Acquisition/SSE requirements, processes, policies, and contracting language to influence cyber resiliency in all phases of the acquisition process. Refine intelligence collection and processes to provide actionable information on cyber threats to the weapons system community. Continue developing common security environments to enable Program Offices to collaborate/share information on classified weapon system cyber intelligence threats and vulnerabilities. Continue to deliver cyber expertise to PEOs through the Cyber Focus Team (CFT) manpower, identify acquisition cyber resiliency training gaps and develop training to support acquisition workforce. Continue identification, evaluation, and prioritization of emerging cyber techniques, products, and technologies for further development and prototyping to posture Air Force weapon systems to counter emerging threats.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> FY 2021 increased compared to FY 2020 by \$14.578 million. Funding increased due to the consolidation of all work from the Increase Acquisition Workforce Cyber Expertise effort in Project 642810, Workforce Development, and the Agile and Adaptable Standards effort in Project 642816, Agile/Adaptable Standards into this effort.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	2.746	17.001	31.579

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate. The government agency responsible for managing the program is the Air Force Life Cycle Management Center, Cyber Resiliency Office for Weapons Systems, Wright-Patterson Air Force Base, Ohio and Hanscom Air Force Base, Massachusetts.



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642812 / <i>Acquisition/System Security Engineering</i>
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Common Cyber Security Environment	Various	Various : Various	-	1.000	Apr 2019	9.550	Nov 2019	7.600	Nov 2020	-		7.600	Continuing	Continuing	-
Products, policy, and processes in the acq life cycle and sustainment process	Various	Various : Various	-	0.738	Apr 2019	0.000		0.000		-		0.000	0.000	0.738	-
Intel collection skills to identify cyber threats to weapon systems	Various	Various : Various	-	0.738	Dec 2019	6.995	Dec 2019	6.500	Dec 2020	-		6.500	Continuing	Continuing	-
Education and Training (AFRL, AFIT, DAU)	Various	Various : Various	-	0.000		0.000		0.900	Jan 2021	-		0.900	Continuing	Continuing	-
Cyber Resiliency Technologies Development	Various	Various : Various	-	0.000		0.000		10.119	Nov 2020	-		10.119	Continuing	Continuing	-
<b>Subtotal</b>			-	2.476		16.545		25.119		-		25.119	Continuing	Continuing	N/A

**Remarks**  
 Previous to FY 2021, Cyber Workforce Development activities are reported under Project 642810, Cyber Workforce Development, and Agile/Adaptable Standards activities are reported under Project 642816, Agile/Adaptable Standards.

<b>Support (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
System Security Engineering requirements, policy and guidance documents (DTIC)	Various	Various : Various	-	0.270	Feb 2019	0.456	Jan 2020	0.456	Jan 2021	-		0.456	Continuing	Continuing	-
MITRE	Various	Various : Bedford, MA	-	0.000		0.000		4.320	Oct 2020	-		4.320	Continuing	Continuing	-
<b>Subtotal</b>			-	0.270		0.456		4.776		-		4.776	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642812 / <i>Acquisition/System Security Engineering</i>
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

**Remarks**  
Previous to FY 2021, Cyber Workforce Development activities are reported under Project 642810, Cyber Workforce Development, and Agile/Adaptable Standards activities are reported under Project 642816, Agile/Adaptable Standards.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS, Travel, Government Purchase Card	Various	Various : Various	-	0.000		0.000		1.684	Dec 2020	-		1.684	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		0.000		1.684		-		1.684	Continuing	Continuing	N/A

**Remarks**  
Previous to FY 2021, Cyber Workforce Development activities are reported under Project 642810, Cyber Workforce Development, and Agile/Adaptable Standards activities are reported under Project 642816, Agile/Adaptable Standards.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	2.746	17.001	31.579	-	31.579	Continuing	Continuing	N/A

**Remarks**  
In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, and Project 642816, Agile/Adaptable Standards, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642812 / <i>Acquisition/System Security Engineering</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Acquisition/System Security Engineering</b>																												
Prototype and deliver common cyber security environments	[REDACTED]																											
Prototype and deliver enhanced system security engineering processes and products	[REDACTED]																											
Prototype and deliver cyber security design and contractual requirements	[REDACTED]																											
Prototype and deliver acquisition cyber intel analysis products and techniques	[REDACTED]																											
Develop advanced weapon system cyber training									[REDACTED]																			
Deploy cyber focus teams									[REDACTED]																			
Prototype advanced cyber resiliency technology									[REDACTED]																			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642812 / <i>Acquisition/System Security Engineering</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Acquisition/System Security Engineering</b>				
Prototype and deliver common cyber security environments	1	2019	4	2025
Prototype and deliver enhanced system security engineering processes and products	2	2019	4	2020
Prototype and deliver cyber security design and contractual requirements	1	2019	4	2022
Prototype and deliver acquisition cyber intel analysis products and techniques	1	2019	4	2025
Develop advanced weapon system cyber training	1	2021	4	2025
Deploy cyber focus teams	1	2021	4	2025
Prototype advanced cyber resiliency technology	1	2021	4	2025

**Note**  
 Previous to FY 2021, Cyber Workforce Development activities are reported under Project 642810, Cyber Workforce Development, and Agile/Adaptable Standards activities are reported under Project 642816, Agile/Adaptable Standards.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>				<b>Project (Number/Name)</b> 642816 / <i>Agile/Adaptable Standards</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
642816: <i>Agile/Adaptable Standards</i>	-	19.420	7.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Agile/Adaptable Standards project identifies, evaluates and prioritizes emerging cyber techniques, products, and technologies for further development and prototyping to posture Air Force weapon systems to counter emerging threats.

In FY 2021, the entirety of work under Project 642816, Agile/Adaptable Standards, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Agile and Adaptable Standards	19.420	7.250	0.000
<b>Description:</b> Develop, prototype, evaluate, and transition agile and adaptable system standards for integration into Air Force weapon systems.			
<b>FY 2020 Plans:</b> Continue open system architecture prototyping, integration and demonstration of components for use in advanced architectures (e.g. electronic warfare (EW), radar, Position, Navigation and Timing (PNT), etc.). Prototype and deliver techniques and methodologies to increase cyber security features of the advanced avionics Government and Regulatory Actions (GRA) and open standards. Continue prototyping the use of alternative navigation techniques and software defined receivers. Start developing a composite GRA for an advanced architectures to include major subsystems like EW, radar, PNT, communications/datalink, and autonomous functions.			
<b>FY 2021 Plans:</b> In FY 2021, the work under this effort will be transferred to the Prototype, Evaluate, and Transition System Security Engineering effort under Project 642812, Acquisition/System Security Engineering.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 decreased compared to FY 2020 by \$7.250 million. Funding decreased due to realignment of Agile and Adaptable Standards activities to the Prototype, Evaluate, and Transition Systems Security Engineering effort under Project 642812, Acquisition/System Security Engineering.			
<b>Accomplishments/Planned Programs Subtotals</b>	19.420	7.250	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642816 / <i>Agile/Adaptable Standards</i>

**C. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**D. Acquisition Strategy**

When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate. The government agency responsible for managing the program is the Air Force Life Cycle Management Center, Cyber Resiliency Office for Weapons Systems, Wright-Patterson Air Force Base, Ohio and Hanscom Air Force Base, Massachusetts.

**UNCLASSIFIED**

**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642816 / <i>Agile/Adaptable Standards</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Cyber Resiliency Technology - Open system architecture	Various	Various : Various	-	2.832	Jun 2019	6.000	Feb 2020	0.000		-		0.000	0.000	8.832	-
Cyber Resiliency Technology - (Firesky, Pitchday, Cloud One)	Various	Various : Various	-	7.740	Jan 2019	1.250	Jan 2020	0.000		-		0.000	0.000	8.990	-
REGI Transition	Various	Various : Various	-	1.500	Aug 2019	-		0.000		-		0.000	0.000	1.500	-
<b>Subtotal</b>			-	12.072		7.250		0.000		-		0.000	0.000	19.322	N/A

**Remarks**  
In FY 2021, the entirety of work under Project 642816, Agile/Adaptable Standards, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Air Force Research Laboratory (AFRL) - SW Arch Health Improvement	Various	Various : Various	-	0.660	Aug 2019	0.000		0.000		-		0.000	0.000	0.660	-
MITRE	Various	Various : Bedford, MA	-	6.688	Oct 2018	0.000		0.000		-		0.000	0.000	6.688	-
<b>Subtotal</b>			-	7.348		0.000		0.000		-		0.000	0.000	7.348	N/A

**Remarks**  
In FY 2021, the entirety of work under Project 642816, Agile/Adaptable Standards, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		-	19.420	7.250	0.000	-	0.000	26.670	N/A

**UNCLASSIFIED**

<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Air Force							<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 3600 / 4			<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>			<b>Project (Number/Name)</b> 642816 / <i>Agile/Adaptable Standards</i>				
	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	

**Remarks**  
 In FY 2021, the entirety of work under Project 642816, Agile/Adaptable Standards, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642816 / <i>Agile/Adaptable Standards</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Agile/Adaptable Standards</i></b>	
Transition resilient embedded GPS/INS (REGI) technology and design to PNT Program Office	████████████████████
Prototype and update open standards	████████████████████

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642816 / <i>Agile/Adaptable Standards</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Agile/Adaptable Standards</i></b>				
Transition resilient embedded GPS/INS (REGI) technology and design to PNT Program Office	3	2019	3	2020
Prototype and update open standards	1	2020	4	2020

**Note**

In FY 2021, the entirety of work under Project 642816, Agile/Adaptable Standards, will be transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642834 / <i>Mitigations</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
642834: <i>Mitigations</i>	-	23.008	17.036	31.307	0.000	31.307	37.527	36.902	34.583	33.633	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Mitigations activity prototypes mitigations to high risk cyber vulnerabilities and recommends a transition path for fielded weapon systems, subsystems, and support systems. The CROWS program will perform the engineering analysis and partner with program offices for the affected weapon systems to develop a mitigation strategy. The CROWS will lead the non-recurring engineering effort to prototype a solution that can be fielded on multiple weapons systems and transition the solution to the programs for implementation and sustainment. It will also develop a mitigation handbook that catalogs proven materiel solutions for use across Air Force weapon systems program offices to maximize return on investment in the prototyping activity.

In FY 2021, Project 642834 is renamed from Mission Assurance for Fielded Systems to Mitigations.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> Cyber Mitigation Prototyping	23.008	17.036	31.307
<b>Description:</b> Evaluate weapon systems and conduct cyber risk assessments to identify, validate, and prioritize cyber vulnerabilities/susceptibilities. Partner with system owners and acquisition Program Offices to develop prototype mitigations.			
<b>FY 2020 Plans:</b> Continue prototyping mitigations for cyber vulnerabilities on fielded weapon systems, subsystems, and support systems in realistic, high fidelity environments. Collaborate with system owners and acquisition program offices to prototype mitigation projects and implement technology transfer of prototyped solutions within the associated acquisition program office. Develop centralized data repository for mitigations addressing weapon system cyber vulnerabilities.			
<b>FY 2021 Plans:</b> Continue prototyping mitigations for cyber vulnerabilities on fielded weapon systems, subsystems, and support systems in realistic, high fidelity environments. Collaborate with system owners and acquisition program offices to prototype mitigation projects and implement technology transfer of prototyped solutions within the associated acquisition program office. Develop centralized data repository for mitigations addressing weapon system cyber vulnerabilities.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 increased compared for FY 2020 by \$14.271 million. Funding increased due to additional emphasis on identification of threat-informed risks/vulnerabilities with weapon system program offices and the associated mitigation projects.			
<b>Accomplishments/Planned Programs Subtotals</b>	23.008	17.036	31.307

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642834 / <i>Mitigations</i>

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures. The government agency responsible for managing the program is the Air Force Life Cycle Management Center, Cyber Resiliency Office for Weapons Systems, Wright-Patterson Air Force Base, Ohio and Hanscom Air Force Base, Massachusetts.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642834 / <i>Mitigations</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Material Solutions for Major Weapon Systems	Various	Various : Various	-	9.974	Dec 2018	5.797	Dec 2019	13.626	Dec 2020	-		13.626	Continuing	Continuing	-
Material Solutions for Subsystems	Various	Various : Various	-	4.990	Dec 2018	2.898	Dec 2019	6.813	Dec 2020	-		6.813	Continuing	Continuing	-
Non-Materiel Solutions	Various	Various : Various	-	2.993	Dec 2018	1.739	Dec 2019	4.088	Dec 2020	-		4.088	Continuing	Continuing	-
Mitigation Distribution Tool	Various	Various : Various	-	1.990	Dec 2018	1.159	Dec 2019	2.724	Dec 2020	-		2.724	Continuing	Continuing	-
<b>Subtotal</b>			-	19.947		11.593		27.251		-		27.251	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Defense Technical Information Center (DTIC)	Various	Various : Various	-	0.000		0.240	Jan 2020	0.240	Jan 2021	-		0.240	Continuing	Continuing	-
Gartner	Various	Various : Various	-	0.151	Jun 2019	0.485	Dec 2019	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	0.151		0.725		0.240		-		0.240	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS, Travel, Government Purchase Card	Various	Various : Various	-	2.910	Oct 2018	4.718	Oct 2019	3.816	Oct 2020	-		3.816	Continuing	Continuing	-
<b>Subtotal</b>			-	2.910		4.718		3.816		-		3.816	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	23.008	17.036	31.307	-	31.307	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642834 / <i>Mitigations</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Mitigations</b>																												
Prototype cyber mitigations on known cyber vulnerabilities																												
Identify transition plan for tested mitigations to known cyber vulnerabilities																												
Mitigation Data Repository																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642834 / <i>Mitigations</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Mitigations</b>				
Prototype cyber mitigations on known cyber vulnerabilities	1	2019	4	2025
Identify transition plan for tested mitigations to known cyber vulnerabilities	1	2019	4	2025
Mitigation Data Repository	1	2019	4	2025

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642836 / <i>Mission Risk Analysis</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
642836: <i>Mission Risk Analysis</i>	-	2.511	6.838	6.897	0.000	6.897	7.574	7.437	6.991	6.798	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Discover and analyze cyber susceptibilities/vulnerabilities to USAF weapon systems and characterize their impacts based on mission risk. Engineer cyber mitigation solutions that can be used across the USAF weapon systems to reduce mission risk. Promote the enhancement of cyber discovery methodologies and capabilities within USAF. Focus is on assessing the gaps and seams that exist between defined weapon system boundaries and within areas that are not assigned to specific weapon system program offices. This activity builds upon existing efforts regarding the identification and mitigation of cyber vulnerabilities, and does not duplicate similar ongoing efforts or conduct redundant assessments on systems that have already been evaluated. As the Acquisition/System Security Engineering activity under Project 642812 develops Cyber Focus Teams, additional, more robust assessment data sets will be generated for CROWS to continue identifying and validating vulnerabilities. This activity provides feedback to focus future assessments and also feeds into the Mitigations activity under Project 642834.

In FY 2021, Project 642836 is renamed from Mission Thread Analysis to Mission Risk Analysis.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> Cyber Mission Risk Analysis	2.511	6.838	6.897
<b>Description:</b> Discovers, analyzes and coordinates sharing of information in support of cyber risk discovery activities for USAF weapon systems.			
<b>FY 2020 Plans:</b> Coordinate cyber vulnerability assessments with FY16 National Defense Authorization Act section 1647, existing program office analyses, and Cyber Focus Teams. Develop solutions to find, assess, and share cyber vulnerabilities through an enterprise-level data analysis capability. Guide and assist cyber mission risk analysis as needed.			
<b>FY 2021 Plans:</b> Continue to coordinate cyber vulnerability assessments and develop a capability to provide focused assessments where required. Continue developing solutions to find, assess and share cyber vulnerabilities through an enterprise-level data analysis capability.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 increased compared to FY 2020 by \$0.059 million. Funding increased due to additional emphasis on continued Cyber Mission risk analysis and discovery on weapons systems and across mission areas.			
<b>Accomplishments/Planned Programs Subtotals</b>	2.511	6.838	6.897



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642836 / <i>Mission Risk Analysis</i>

**C. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**D. Acquisition Strategy**

When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate. The government agency responsible for managing the program is the Air Force Life Cycle Management Center, Cyber Resiliency Office for Weapons Systems, Wright-Patterson Air Force Base, Ohio and Hanscom Air Force Base, Massachusetts.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642836 / <i>Mission Risk Analysis</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Air Force Research Laboratory (AFRL), Automatic Thread Generation, Mission Thread Analysis Tools	Various	Various : Various	-	1.911	Feb 2019	0.000		0.000		-		0.000	Continuing	Continuing	-
Risk Analysis and Discovery	Various	Various : Various	-	0.000	Apr 2019	4.038	Jan 2020	4.066	Dec 2020	-		4.066	Continuing	Continuing	-
Data Repository	Various	Various : Various	-	0.000		2.800	Jan 2020	2.831	Dec 2020	-		2.831	Continuing	Continuing	-
<b>Subtotal</b>			-	1.911		6.838		6.897		-		6.897	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Defense Technical Information Center (DTIC)	Various	Various : Various	-	0.600	Apr 2019	0.000		0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	0.600		0.000		0.000		-		0.000	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	2.511	6.838	6.897	-	6.897	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642836 / <i>Mission Risk Analysis</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Mission Risk Analysis</b>																												
Develop, institutionalize and utilize a Data Aggregation & Analytics Tool (DAAT).	[REDACTED]																											
Execute risk analysis and discovery on weapons systems and across mission areas. Leverage and augment existing and emerging assessment environments and tools.	[REDACTED]																											
Engineer solution candidates for reducing cyber risk with USAF weapon systems.	[REDACTED]																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	<b>Project (Number/Name)</b> 642836 / <i>Mission Risk Analysis</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Mission Risk Analysis</i></b>				
Develop, institutionalize and utilize a Data Aggregation & Analytics Tool (DAAT).	2	2019	4	2025
Execute risk analysis and discovery on weapons systems and across mission areas. Leverage and augment existing and emerging assessment environments and tools.	1	2020	4	2025
Engineer solution candidates for reducing cyber risk with USAF weapon systems.	1	2020	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	27.301	28.034	25.835	0.000	25.835	30.006	30.542	31.088	31.660	Continuing	Continuing
640211: <i>GLOBAL ACCESS</i>	-	7.718	7.493	5.633	0.000	5.633	7.792	7.930	8.072	8.221	Continuing	Continuing
640212: <i>C2/OPTIMIZATION/ MODELING AND SIMULATION</i>	-	14.387	15.183	14.773	0.000	14.773	16.670	16.969	17.272	17.589	Continuing	Continuing
640213: <i>CYBER</i>	-	5.196	5.358	5.429	0.000	5.429	5.544	5.643	5.744	5.850	Continuing	Continuing

**Note**

- This program, BA 4, PE 0604776F, project 640211, Submersible Matting, is a new start.
- This program, BA 4, PE 0604776F, project 640211, Rapid Available Interface for trans-Loading, is a new start.
- This program, BA 4, PE 0604776F, project 640211, Repair and Retrofit of Railway Systems, is a new start.
- This program, BA 4, PE 0604776F, project 640211, Drone Supported Surface Deployment, is a new start.
- This program, BA 4, PE 0604776F, project 640211, Buoyant Roll On/Roll Off Interface Kit, is a new start.
- This program, BA 4, PE 0604776F, project 640211, 35 Thousand Foot Airdrop, is a new start.
- This program, BA 4, PE 0604776F, project 640211, Aerial Port of the Future JCTD, is a new start.

**A. Mission Description and Budget Item Justification**

This program provides for the development, integration, demonstration and detailed assessment of capabilities which improve deployment, distribution and supply chain decision-making/collaboration (e.g., planning stage to real-time execution/retrograde operations) without need for highly specialized operators. Projects in this area address the following: decision support tools, distribution process simulations/analytics, distribution demand forecasting/execution monitoring, automated decision-maker support (e.g., queuing, alerting, courses of action), automated status monitoring with information fusion to include drilldown capability, and resilient Command & Control (C2) infrastructure capabilities. Current planning, forecasting, and collaboration capabilities do not permit full synchronization of people, processes and assets to execute planned operations. Automated tools must be able to dynamically analyze/predict demand and provide input to advanced distribution planning systems to include the capability for Combatant Commanders to manage theater transportation operations from the port of debarkation to the point of need. Transportation information exchange across the DOD is inhibited by disparate systems, multiple data standards and insufficient interfaces. The ability to rapidly determine the impact of any delays/changes and conduct "what-if" impact assessments on the closure of force packages is required. This project addresses the required mission support to combatant commanders and other customers in the area of C2, Optimization, and Modeling and Simulations.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	27.964	28.034	28.939	0.000	28.939
Current President's Budget	27.301	28.034	25.835	0.000	25.835
Total Adjustments	-0.663	0.000	-3.104	0.000	-3.104
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-0.241	0.000			
• SBIR/STTR Transfer	-0.422	0.000			
• Other Adjustments	0.000	0.000	-3.104	0.000	-3.104

**Change Summary Explanation**

FY 2018 funds include \$0.015 million pending transfer to the Rapid Prototyping Fund in accordance with PL 114-92; section 828, Penalty for Cost Overruns, as amended by PL 115-91 section 825(a).

FY 2019 funds include \$0.058 million withhold pending final determination of Penalty for Cost Overruns in accordance with PL 114-92 as amended by PL 115 -91 section 825(a).

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
640211: <i>GLOBAL ACCESS</i>	-	7.718	7.493	5.633	0.000	5.633	7.792	7.930	8.072	8.221	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

- This program, BA 4, PE 0604776F, project 640211, Submersible Matting, is a new start.
- This program, BA 4, PE 0604776F, project 640211, Rapid Available Interface for trans-Loading, is a new start.
- This program, BA 4, PE 0604776F, project 640211, Repair and Retrofit of Railway Systems, is a new start.
- This program, BA 4, PE 0604776F, project 640211, Drone Supported Surface Deployment, is a new start.
- This program, BA 4, PE 0604776F, project 640211, Buoyant Roll On/Roll Off Interface Kit, is a new start.
- This program, BA 4, PE 0604776F, project 640211, 35 Thousand Foot Airdrop, is a new start.
- This program, BA 4, PE 0604776F, project 640211, Aerial Port of the Future JCTD, is a new start.

In FY 2017, PE 0603713S (BA3) Deployment and Distribution Enterprise Technology (DDET) and PE 0603264S (BA3) Agile Transportation for the 21st Century Theater were transferred to a single PE in the Air Force budget (PE0604776F, (BA4) Deployment and Distribution Enterprise (DDE)) in order to support auditability, increase management efficiency, and reduce administrative actions.

**A. Mission Description and Budget Item Justification**

This program provides for the development, integration, demonstration and detailed assessment of DOD procedures/technologies targeted at optimizing throughput at the nodes as well as across the conduits of the deployment and distribution supply chains, from origin to point of use as well as return. Needed capabilities include inventory/cargo management, materiel handling innovations, improved physical node access, port throughput improvements, innovative delivery methods (e.g., precision airlift, autonomous re-supply), and cargo/container security. This project addresses required mission support to combatant commanders and other customers of DOD's distribution and transportation systems in the area of deployment/distribution velocity management, manned/unmanned systems to the point of effect, and increased global reach in austere/anti-access environments.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> Autonomous 60K Tunner	-	0.700	0.400
<b>Description:</b> Autonomous Technologies applied to the 60K Tunner to improve throughput and safety			
<b>FY 2020 Plans:</b> Apply semi autonomous technologies and testing			
<b>FY 2021 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Test semi autonomous technologies  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Various technologies applied varies the costs				
<b>Title:</b> Joint Deployable Airborne Package  <b>Description:</b> Airworthiness certification for a rapidly deployable, modular and scalable airborne C4 communications platform to replace the current antiquated and end-of-life Joint Airborne Communications Center/Command Post  <b>FY 2020 Plans:</b> Project ended FY19  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A		0.125	0.000	-
<b>Title:</b> Submersible Matting  <b>Description:</b> Develop a submersible matting system (SUBMAT) to facilitate mobility across the shoreline and wet/dry gaps by combining current soil stability technology and mobility matting into a single product.  <b>FY 2020 Plans:</b> FY21 New Start  <b>FY 2021 Plans:</b> Design for manufacture analysis and preliminary fabrication  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 New Start		-	0.000	0.400
<b>Title:</b> Rapid Available Interface for trans-Loading  <b>Description:</b> Provides a process to rapidly assess the condition, design acceptable repairs and delivers pre-kitted rail repair and retrofit solutions. The standardized repair kits allows for the development of Tactics, Techniques and Procedures (TTPs) for each repair that can be scaled to address a range of damages.  <b>FY 2020 Plans:</b> Funding starts in FY21  <b>FY 2021 Plans:</b>		-	0.000	0.400



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Work will identify and develop a robotic survey vehicle integrated with rail condition survey equipment. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Prior year funding by OSD/services.				
<b>Title:</b> Repair and Retrofit of Railway Systems <b>Description:</b> The standardized repair kits allows for the development of Tactics, Techniques and Procedures (TTPs) for each repair that can be scaled to address a range of damages. <b>FY 2020 Plans:</b> Effort starts in FY21 <b>FY 2021 Plans:</b> Work will identify and develop a robotic survey vehicle integrated with rail condition survey equipment. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 start		-	0.000	0.175
<b>Title:</b> Drone Supported Surface Deployment <b>Description:</b> Determine the suitability of using modern drones and drone mapping technology for capturing data for input to systems such as the Integrated Computerized Deployment System (ICODES) and the Transportation Geospatial Information System (TGIS) <b>FY 2020 Plans:</b> FY21 New start <b>FY 2021 Plans:</b> Analyze RFID Hardware, Middleware and Software <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 New Start		-	0.000	0.227
<b>Title:</b> Buoyant Roll On/Roll Off Interface Kit <b>Description:</b> Prototype consisting of the RO/RO ramp to interface to a commercial supply vessel and a section of floating causeway and ancillary equipment sufficient to conduct a limited operational assessment <b>FY 2020 Plans:</b>		-	0.000	0.300

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>FY21 New Start</p> <p><b>FY 2021 Plans:</b> Develop a prototype rapidly deployable ship-to-shore connector capability</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 New Start</p>				
<p><b>Title:</b> 35 Thousand Foot Airdrop</p> <p><b>Description:</b> Develop capabilities to airdrop from 35 thousand feet to increase aircraft standoff range from threat.</p> <p><b>FY 2020 Plans:</b> FY21 New Start</p> <p><b>FY 2021 Plans:</b> parafoil and parachute technologies</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Fy21 New Start</p>		-	0.000	0.400
<p><b>Title:</b> Aerial Port of the Future JCTD</p> <p><b>Description:</b> Series of technologies in collaboration with OSD and services to automate aerial port activities. Improves efficiency and safety.</p> <p><b>FY 2020 Plans:</b> FY21 New Start</p> <p><b>FY 2021 Plans:</b> Development of automation technologies</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 New Start</p>		-	0.000	0.400
<p><b>Title:</b> Interoperable Multi-modal Patient Movement</p> <p><b>Description:</b> Create system to move mass casualties when air medivac is not available</p> <p><b>FY 2020 Plans:</b></p>		-	0.500	0.150

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Develop interoperable multi-modal platform <i>FY 2021 Plans:</i> Continue development and testing <i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Various technologies varies development costs				
<i>Title:</i> Replenishment from Ships to Point of Need Delivery <i>Description:</i> Unmanned system launched from ships and capable of carrying supplies up to 100 miles inland. <i>FY 2020 Plans:</i> testing various payloads and distance calculations <i>FY 2021 Plans:</i> Development of technologies to support required payloads and distances <i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Various technologies varies development costs		-	0.600	0.450
<i>Title:</i> Use of Dual Row Airdrop System with Joint Light Tactical Vehicle <i>Description:</i> Increasing the strength of C-17 dual row rails to enable dropping the JLTV <i>FY 2020 Plans:</i> Testing of above-the-floor release mechanisms <i>FY 2021 Plans:</i> Applying technologies and testing results <i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Applying technologies and testing results		-	0.750	0.575
<i>Title:</i> Port Improvement via Exigent Repair (PIER) JCTD <i>Description:</i> Develop robust capability to rapidly restore damaged pier to a minimal militarily-capable to support reception, power projection & sustainment operations. <i>FY 2020 Plans:</i>		1.255	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Projects ends 2019 <b>FY 2021 Plans:</b> no program change plans <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Project ends in 2019				
<b>Title:</b> Autonomous Aerial Insertion and Resupply into Dense Urban Complex Terrain (AAIRDUCT) Joint Capabilities Technology Demonstration (JCTD) <b>Description:</b> Enhance capability of a guided airdrop system to navigate in contested/denied environments where Global Positioning System data is either suspect or unavailable. <b>FY 2020 Plans:</b> Project ends 2019 <b>FY 2021 Plans:</b> No program change <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> no program change		1.950	0.000	0.000
<b>Title:</b> Enhanced Vision Navigation for Joint Precision Airdrop System (Supports FY17 AAIRDUCT JCTD) <b>Description:</b> Advanced technologies to improve airdrop capabilities to the warfighter. <b>FY 2020 Plans:</b> Project support requirement <b>FY 2021 Plans:</b> Program support requirements <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No significant change		0.544	0.350	0.175
<b>Title:</b> Expeditionary End-to-End Fueling Concept <b>Description:</b> Addressing gap in theater fuel delivery/distribution capabilities to inform the development of the Army Early Entry Fluid Distribution System as well as provide a development path for Navy/USMC ship-to-shore capabilities.		1.170	0.800	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>FY 2020 Plans:</b> demonstration of fueling ashore operations</p> <p><b>FY 2021 Plans:</b> Project ends 2020</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Project ends 2020</p>				
<p><b>Title:</b> Dropsonde Optimization</p> <p><b>Description:</b> Mobility assets lack drop zone situational awareness, pre-drop confirmation of clear/safe drop zone, capability of post-drop assessment, and autonomous/passive bundle geo-location.</p> <p><b>FY 2020 Plans:</b> Project ends 2019</p> <p><b>FY 2021 Plans:</b> No effort in 2021</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Project ends 2019</p>		0.314	0.000	0.000
<p><b>Title:</b> Advanced Planning for Global Response Force Mission</p> <p><b>Description:</b> Create and leverage analytical and visual tools to provide planners the ability to streamline GRF missions, integrating aircraft load planning with sophisticated airdrop mission simulations.</p> <p><b>FY 2020 Plans:</b> Completing planning tool development</p> <p><b>FY 2021 Plans:</b> No effort in 2021</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Project ends 2020</p>		0.300	0.700	0.000
<p><b>Title:</b> Autonomous Drone Delivery from Airdrop Systems</p> <p><b>Description:</b> An air-droppable Unmanned Aircraft System (UAS) to conduct resupply missions in densely populated urban areas.</p>		0.210	0.750	0.220

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>FY 2020 Plans:</b> development and demonstration of drone delivery from JPADS</p> <p><b>FY 2021 Plans:</b> continued development and testing</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> no significant decrease</p>				
<p><b>Title:</b> Mini Robotic Dredge</p> <p><b>Description:</b> Prototype a tactical dredging capability to deepen an usable port facility</p> <p><b>FY 2020 Plans:</b> Complete development of dredge and demo</p> <p><b>FY 2021 Plans:</b> No effort in 2021</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Project ends 2020</p>		0.850	0.800	0.000
<p><b>Title:</b> Optimized HALO Delivery using Probablistic Airdrop Planner</p> <p><b>Description:</b> A low-cost, low-complexity solution to deliver payloads at improved accuracy, compared to standard ballistic parachutes, but without the expensive parafoil and guidance systems</p> <p><b>FY 2020 Plans:</b> complete development of planner</p> <p><b>FY 2021 Plans:</b> no effort in 2021</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Project ends 2020</p>		0.200	0.500	0.000
<p><b>Title:</b> Expedient and Expeditionary Airfield Damage Repair</p> <p><b>Description:</b> Provide a truly expeditionary, indigenous-material based repair capability to support high pace, aircraft sortie generation, recovery and egress</p>		0.300	0.600	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b><i>FY 2020 Plans:</i></b> Demonstrate and complete development of repair effort  <b><i>FY 2021 Plans:</i></b> No effort in 2021  <b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Project ends 2020				
<b><i>Title:</i></b> Unmanned Logistics System - Air  <b><i>Description:</i></b> Provides the warfighter with an assured/organic resupply capability to sustain maneuver units  <b><i>FY 2020 Plans:</i></b> Project ends 2019  <b><i>FY 2021 Plans:</i></b> no effort in 2021  <b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Project ends 2019		0.500	0.000	0.000
<b><i>Title:</i></b> Resilient Expeditionary Agile Littoral Logistics  <b><i>Description:</i></b> Transfer of fuel ashore from various conveyances from off-shore platform  <b><i>FY 2020 Plans:</i></b> Testing platform types  <b><i>FY 2021 Plans:</i></b> Technology development of fuel transfer  <b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Technology development varies as project progresses		-	0.443	1.361
<b>Accomplishments/Planned Programs Subtotals</b>		7.718	7.493	5.633
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>

**C. Other Program Funding Summary (\$ in Millions)**

**Remarks**

**D. Acquisition Strategy**

Requirements for joint deployment and distribution enterprise technology enhancements are annually identified, validated and prioritized by the Joint Deployment & Distribution Enterprise (JDDE) community. Pursuit of the development of new capabilities to meet these requirements is managed by the United States Transportation Command (USTRANSCOM). Prototype products, once evaluated by the users, are spirally transitioned by the operational community.



**UNCLASSIFIED**

**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Integrated Logistics Support	Various	Various : Belleville, IL	-	7.718	Nov 2018	7.493	Nov 2019	5.633	Nov 2020	-		5.633	Continuing	Continuing	-
<b>Subtotal</b>			-	7.718		7.493		5.633		-		5.633	Continuing	Continuing	N/A

**Remarks**  
Funds will be realigned within the PE.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	7.718	7.493	5.633	-	5.633	Continuing	Continuing	N/A

**Remarks**

**UNCLASSIFIED**

<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Deployment and Distribution</i>																												
Integrated Logistics Support																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640211 / <i>GLOBAL ACCESS</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Deployment and Distribution</i></b>				
Integrated Logistics Support	1	2019	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>				<b>Project (Number/Name)</b> 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
640212: <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>	-	14.387	15.183	14.773	0.000	14.773	16.670	16.969	17.272	17.589	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY 2017, PE 0603713S (BA3) Deployment and Distribution Enterprise Technology (DDET) and PE 0603264S (BA3) Agile Transportation for the 21st Century Theater were transferred to a single PE in the Air Force budget (PE0604776F, (BA4) Deployment and Distribution Enterprise (DDE)) in order to support auditability, increase management efficiency, and reduce administrative actions.

**A. Mission Description and Budget Item Justification**

This program provides for the development, integration, demonstration and detailed assessment of capabilities which improve deployment, distribution and supply chain decision-making/collaboration (e.g., planning stage to real-time execution/retrograde operations) without need for highly specialized operators. Projects in this area address the following: decision support tools, distribution process simulations/analytics, distribution demand forecasting/execution monitoring, automated decision-maker support (e.g., queuing, alerting, courses of action), automated status monitoring with information fusion to include drilldown capability, and resilient Command & Control (C2) infrastructure capabilities. Current planning, forecasting, and collaboration capabilities do not permit full synchronization of people, processes and assets to execute planned operations. Automated tools must be able to dynamically analyze/predict demand and provide input to advanced distribution planning systems to include the capability for Combatant Commanders to manage theater transportation operations from the port of debarkation to the point of need. Transportation information exchange across the DOD is inhibited by disparate systems, multiple data standards and insufficient interfaces. The ability to rapidly determine the impact of any delays/changes and conduct "what-if" impact assessments on the closure of force packages is required. This project addresses the required mission support to combatant commanders and other customers in the area of C2, Optimization, and Modeling and Simulations.

**B. Accomplishments/Planned Programs (\$ in Millions)**

<b>Title:</b> TRANSCOM Innovation	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Description:</b> Rapidly develop and integrate technology solutions for the enterprise	0.000	1.986	4.358
<b>FY 2020 Plans:</b> Develop solutions to identified challenges			
<b>FY 2021 Plans:</b> Continue to pursue and develop solutions to identified challenges			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Greater push for the development of solutions to identified challenges and Joint Deployment and Distribution Enterprise needs.				
<b>Title:</b> Analytics Driven Command Decision Support <b>Description:</b> Developing the capability that improves organizational decision making by providing a holistic methodology that capitalizes on relevant information, captures accurate data, and leverages best practice tools and decision-making processes. <b>FY 2020 Plans:</b> No funding in FY 2020 <b>FY 2021 Plans:</b> No Funding in 2021 <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No funding in 2021		0.557	0.000	0.000
<b>Title:</b> Strategies for Artificial Intelligence and Machine Learning <b>Description:</b> This research effort is to demonstrate the potential of AI/ML to increase the effectiveness and value of USTRANSCOM's Big Data initiatives while also leveraging cloud computing capabilities. <b>FY 2020 Plans:</b> FY20 funding moved to MIT Lincoln Labs <b>FY 2021 Plans:</b> Continue to improve data quality and analytical capabilities <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY20 funding moved to MIT Lincoln Labs		-	0.000	0.950
<b>Title:</b> Data Lake <b>Description:</b> Develop and demonstrate the capability that allows incongruent data to be brought together to provide automated decision support. <b>FY 2020 Plans:</b> Develop data analytics <b>FY 2021 Plans:</b>		0.975	1.477	0.695

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Continue data analytics development				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 is testing earlier development efforts				
<b>Title:</b> End-to-End Deployment and Distribution Modeling		3.452	2.500	2.375
<b>Description:</b> Provide an integrated deployment/distribution environment to provide continuous and optimal balancing of total demand verse capacity from planning through mission execution.				
<b>FY 2020 Plans:</b> Increase analytical capability for DoD programmatic studies and analysis				
<b>FY 2021 Plans:</b> Increase analytical capability for DoD programmatic studies and analysis				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Demonstrations and testing				
<b>Title:</b> Massachusetts Institute of Technology Lincoln Labs		3.052	3.250	2.970
<b>Description:</b> Partnership with MIT-LL to research efforts to improve enterprise operational architecture supporting high-end analytics, integrated information technology/data structures, understanding of cloud capabilities and multi-level cyber security defense.				
<b>FY 2020 Plans:</b> Effective secure operations enabled via data fusion frameworks and prototypes.				
<b>FY 2021 Plans:</b> Continue effective secure operations enabled via data fusion frameworks and prototypes.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No significant change				
<b>Title:</b> Modeling & Simulation Innovation		0.125	0.125	0.225
<b>Description:</b> Select student research/faculty-assisted projects (e.g., Joint Transportation Asset Scheduling Kit, Next Generation Cargo Capability, Applying Post Modern Portfolio Theory to Mitigate Risk in International Shipping, Optimal CH-47/C-130 Workload Balance, Remotely Piloted Aircraft Performing Airdrop Mission).				
<b>FY 2020 Plans:</b>				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Collaboration partnership with AFIT for student research <b>FY 2021 Plans:</b> Collaboration partnership with AFIT for student research <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> additional requirements				
<b>Title:</b> Infrastructure Information Confidence Model <b>Description:</b> Inform decision makers of the quality of primary and alternate data sources they are using to make decisions <b>FY 2020 Plans:</b> Continue development of information collaboration process that analyzes and provides a confidence assessment of structured and unstructured data <b>FY 2021 Plans:</b> Continue development of information collaboration process that analyzes and provides a confidence assessment of structured and unstructured data <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Costs vary as development continues		0.918	1.137	0.909
<b>Title:</b> Program Execution <b>Description:</b> Provide technical assistance and program management support to the USTRANSCOM RDT&E Program. <b>FY 2020 Plans:</b> TRL 4-6: Program support to explore technology solutions to capability gaps identified through Joint Concept Development documents, the Joint capabilities Integration and Development System process, Joint Experimentation, etc, to increase the responsiveness, efficiency and effectiveness of the Joint Deployment and Distribution Enterprise. <b>FY 2021 Plans:</b> TRL 4-6: Program support to explore technology solutions to capability gaps identified through Joint Concept Development documents, the Joint capabilities Integration and Development System process, Joint Experimentation, etc, to increase the responsiveness, efficiency and effectiveness of the Joint Deployment and Distribution Enterprise. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No significant change		1.485	1.221	1.741
<b>Title:</b> Scheduling Mobility Aircrews for Readiness and Transportation		1.974	2.150	0.550

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> Develop prototype software for advanced squadron scheduling, collaboration, and predictive modeling.</p> <p><b>FY 2020 Plans:</b> Complete development of the squadron scheduler and visualizations.</p> <p><b>FY 2021 Plans:</b> No plans in 2020</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Project ends 2020</p>				
<p><b>Title:</b> Full Spectrum Mission Assurance</p> <p><b>Description:</b> All-threats/hazards, collaborative transportation risk management activity to identify unacceptable physical/cyber risks</p> <p><b>FY 2020 Plans:</b> Complete the operational picture environment fed by standardized, reusable, and shareable data layers of actionable info.</p> <p><b>FY 2021 Plans:</b> no plans in 2021</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Project ends 2020</p>		0.979	0.998	0.000
<p><b>Title:</b> Modeling Dynamics of Modular Causeways to Improve Debarkation Sites</p> <p><b>Description:</b> High-fidelity model to provide planners with precise knowledge of Modular Causeway behavior.</p> <p><b>FY 2020 Plans:</b> Population of database, demonstration and training</p> <p><b>FY 2021 Plans:</b> Project ends in 2020</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Project ends 2020</p>		0.350	0.339	0.000
<p><b>Title:</b> Web Based Seaport Explosive Safety Planning</p> <p><b>Description:</b> Provide seaport planners capability to manage net explosive weight/hazard munitions</p>		0.520	0.000	0.000



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b><i>FY 2020 Plans:</i></b> Project ends 2019			
<b><i>FY 2021 Plans:</i></b> Project ends 2019			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Project ends 2019			
<b>Accomplishments/Planned Programs Subtotals</b>	14.387	15.183	14.773

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Requirements for joint deployment and distribution enterprise technology enhancements are annually identified, validated and prioritized by the Joint Deployment & Distribution Enterprise (JDDE) community. Pursuit of the development of new/improved capabilities to meet these requirements is managed by the United States Transportation Command (USTRANSCOM). Prototype products, once evaluated by the users, are spirally transitioned by the operational community.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Integrated Logistics Support	Various	Various : Belleville, IL	-	14.387	Nov 2018	15.183	Nov 2019	14.773	Nov 2020	-		14.773	Continuing	Continuing	-
<b>Subtotal</b>			-	14.387		15.183		14.773		-		14.773	Continuing	Continuing	N/A

**Remarks**  
Funds will be realigned within PE.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	14.387	15.183	14.773	-	14.773	Continuing	Continuing	N/A

**Remarks**

**UNCLASSIFIED**

<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Deployment and Distribution</i>																												
Integrated Logistics Support																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Deployment and Distribution</i></b>				
Integrated Logistics Support	1	2019	4	2025

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640213 / <i>CYBER</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
640213: <i>CYBER</i>	-	5.196	5.358	5.429	0.000	5.429	5.544	5.643	5.744	5.850	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY 2017, PE 0603713S (BA3) Deployment and Distribution Enterprise Technology (DDET) and PE 0603264S (BA3) Agile Transportation for the 21st Century Theater were transferred to a single PE in the Air Force budget (PE0604776F, (BA4) Deployment and Distribution Enterprise (DDE)) in order to support auditability, increase management efficiency, and reduce administrative actions.

**A. Mission Description and Budget Item Justification**

This program provides for the development, integration, demonstration and detailed assessment of capabilities to ensure USTRANSCOM mission assurance is in a persuasive/dynamic cyber environment. USTRANSCOM requires the procedures/technologies to improve cyber surveillance and control of networks across multiple domains and the ability to continue critical network operations in contested unclassified and classified network environments. The Command also needs the ability to differentiate between valid/unauthorized users and determine/quantify the trustworthiness of hardware/software systems. Additionally USTRANSCOM must have the ability to rapidly analyze & correlate data regarding malicious activities, select/evoke real-time defense actuators, perform automated reasoning capabilities that address data quality issues, and the ability to rapidly return to a known/safe operating state.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<p><b>Title:</b> Lincoln Labs</p> <p><b>Description:</b> Partnership with MIT-LL to research efforts to improve enterprise operational architecture supporting high-end analytics, integrated information technology/data structures, understanding of cloud capabilities and multi-level cyber security defense.</p> <p><b>FY 2020 Plans:</b> Increased awareness and ability to respond to cyber events</p> <p><b>FY 2021 Plans:</b> Continue increased awareness and ability to respond to cyber events</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No significant change</p>	2.793	5.358	5.429
<p><b>Title:</b> Operationally Transparent Cyber</p> <p><b>Description:</b> Rapidly identify, track, and eliminate malicious actor behavior and defend against Advanced Persistent Threats in near real-time</p>	2.403	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640213 / <i>CYBER</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b><i>FY 2020 Plans:</i></b> Project cancelled in FY19			
<b><i>FY 2021 Plans:</i></b> Project cancelled in FY19			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Project cancelled in FY19			
<b>Accomplishments/Planned Programs Subtotals</b>	5.196	5.358	5.429

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Requirements for joint deployment and distribution enterprise technology enhancements are annually identified, validated and prioritized by the Joint Deployment & Distribution Enterprise (JDDE) community. Pursuit of the development of new/improved capabilities to meet these requirements is managed by the United States Transportation Command (USTRANSCOM). Prototype products, once evaluated by the users, are spirally transitioned by the operational community.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640213 / <i>CYBER</i>
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Integrated Logistics Support	Various	Various : Belleville, IL	-	5.196	Nov 2018	5.358	Nov 2019	5.429	Nov 2020	-		5.429	Continuing	Continuing	-
<b>Subtotal</b>			-	5.196		5.358		5.429		-		5.429	Continuing	Continuing	N/A

**Remarks**  
Funds will be realigned within the PE.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	5.196	5.358	5.429	-	5.429	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640213 / <i>CYBER</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Deployment and Distribution</i>																												
Integrated Logistics Support																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604776F / <i>Deployment &amp; Distribution Enterprise R&amp;D</i>	<b>Project (Number/Name)</b> 640213 / <i>CYBER</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Deployment and Distribution</i>				
Integrated Logistics Support	1	2019	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	163.132	314.926	219.252	0.000	219.252	259.128	158.445	75.014	44.655	Continuing	Continuing
645350: <i>Experimentation</i>	-	84.179	186.798	81.522	0.000	81.522	83.244	84.735	75.014	44.655	Continuing	Continuing
645351: <i>Prototyping</i>	-	78.953	128.128	137.730	0.000	137.730	175.884	73.710	0.000	0.000	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

The Tech Transition Program provides funding to demonstrate, prototype, and experiment with technologies and concepts to enable or accelerate their transition to acquisition programs and/or operational use. The Technology Transition Program addresses the gap between initial technology or concept development and demonstration, and successful acquisition and operational capability implementation. Experimentation explores new concepts and their applications in potential future operating environments within a system-of-systems context. Prototyping enables integration and demonstration of emerging technologies to quickly move them into warfighting capability. The Tech Transition Program allows acquisition program managers (the capability developers) and warfighters (the capability recipients and end users) to prototype, integrate, and demonstrate candidate technologies and assess them in an operational environment in partnership with Program Executive Officers, schoolhouses, simulation facilities, and development planning organizations.

In addition, this program element may include necessary civilian pay expenses required to manage, execute, and deliver future weapons system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

The FY 2021 funding request was reduced by \$17.830 million to account for availability of prior year execution balances.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	167.277	154.926	280.495	0.000	280.495
Current President's Budget	163.132	314.926	219.252	0.000	219.252
Total Adjustments	-4.145	160.000	-61.243	0.000	-61.243
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	160.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.500	0.000			
• SBIR/STTR Transfer	-5.645	0.000			
• Other Adjustments	0.000	0.000	-61.243	0.000	-61.243

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project: 645350: *Experimentation***

Congressional Add: *Program Increase - Low Cost Attributable Aircraft Technology*

Congressional Add: *Program Increase - Directed Energy Experimentation*

Congressional Add Subtotals for Project: 645350

**Project: 645351: *Prototyping***

Congressional Add: *Program Increase - Alternative Energy Research*

Congressional Add: *Program Increase - Laser Coating Removal Technology*

Congressional Add: *Program Increase - Health and Logistics Management Technology*

Congressional Add: *Program Increase - Competitively Awarded Technology Transition Initiatives*

Congressional Add: *Program Increase - Rapid Sustainment Office*

Congressional Add: *Program Increase - Reliable Power for Critical Infrastructure*

Congressional Add: *Program Increase - Logistics Technologies*

Congressional Add: *Program Increase - Small Satellite Manufacturing*

Congressional Add: *Program Increase - Advanced Repair and Qualification Processes*

Congressional Add: *Program Increase - Additive Manufacturing*

Congressional Add Subtotals for Project: 645351

Congressional Add Totals for all Projects

	FY 2019	FY 2020
	0.000	100.000
	0.000	5.000
Congressional Add Subtotals for Project: 645350	0.000	105.000
	4.832	0.000
	9.663	0.000
	4.832	0.000
	9.663	0.000
	0.000	20.000
	0.000	6.000
	0.000	5.000
	0.000	8.000
	0.000	6.000
	0.000	10.000
Congressional Add Subtotals for Project: 645351	28.990	55.000
Congressional Add Totals for all Projects	28.990	160.000

**Change Summary Explanation**

Increase in FY 2019 of \$1.500 million due to reprogramming for human resource software prototype.

Decrease in FY 2021 of \$61.243 million due to reduced emphasis in prototyping due to higher Department of Defense and Air Force priorities and to account for availability of prior year execution balances and Department of Defense inflationary factors.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>				<b>Project (Number/Name)</b> 645350 / <i>Experimentation</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
645350: <i>Experimentation</i>	-	84.179	186.798	81.522	0.000	81.522	83.244	84.735	75.014	44.655	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Experimentation project funds experimentation campaigns to explore new concepts and their applications in potential future operating environments within a system-of-systems context. Concepts and enabling technologies such as, but not limited to, artificial intelligence, machine learning, directed energy weapons and multi-domain operations hold great promise, yet their transition to acquisition programs and fielded capabilities is typically hampered due to uncertainties regarding their military application and organizational implications. Implementing successful transition approaches for complex and widely applicable concepts requires a comprehensive and coordinated campaign of learning. Experimentation campaigns enable organizational learning through the methodical and systematic application of experimentation and supporting analysis. Experimentation campaigns are centered on an operational level warfighting concept to provide context for assessment, and use wargaming, simulation, and field experimentation to evolve, refine, and validate the warfighting concept leading to solid, evidentiary-based materiel and non-materiel capability development approaches with associated recommendations. Experimentation campaigns improve the effectiveness of operations by developing concepts and generating new information to address challenging threats of the future which aids the fielding of advanced technologies by providing the credible evidence decision makers need to make sound strategic decisions and investment choices. Experimentation campaigns are directed by the Air Force Capability Development Council, Air Force Warfighting Integration Capability, and SAF/AQ, to ensure funding supports the highest Air Force priorities. Experimentation is focused on rapid learning and then pivoting based on that learning. Therefore, specific plans are not detailed to prevent locking into an approach that will likely shift based on current experimentation efforts. Further details can be provided in the appropriate forum.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Experimentation Campaigns	84.179	81.798	81.522
<b>Description:</b> Execution of experimentation campaigns to explore promising concepts and enabling technologies. Activities may include facilitated workshops, wargaming, modeling and simulation, and virtual and hardware prototyping to enable experimentation campaigns.			
<b>FY 2020 Plans:</b> Continue experimentation campaigns to advance multi-domain operations and other high priority areas, as directed by the Air Force Capability Development Council, Air Force Warfighting Integration Capability, and SAF/AQ. Experimentation is focused on rapid learning and then pivoting based on that learning. Therefore, specific plans are not detailed to prevent locking into an approach that will likely shift based on current experimentation efforts.			
<b>FY 2021 Plans:</b> Continue experimentation campaigns to advance multi-domain operations and other high priority areas, as directed by the Air Force Capability Development Council, Air Force Warfighting Integration Capability, and SAF/AQ. Experimentation is focused			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>	<b>Project (Number/Name)</b> 645350 / <i>Experimentation</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
on rapid learning and then pivoting based on that learning. Therefore, specific plans are not detailed to prevent locking into an approach that will likely shift based on current experimentation efforts.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> FY 2021 decreased compared to FY 2020 by \$0.276 million due to inflation.			
<b>Accomplishments/Planned Programs Subtotals</b>	84.179	81.798	81.522

	FY 2019	FY 2020
<b><i>Congressional Add:</i></b> Program Increase - Low Cost Attributable Aircraft Technology	0.000	100.000
<b><i>FY 2019 Accomplishments:</i></b> Not Applicable		
<b><i>FY 2020 Plans:</i></b> Conduct Congressionally-directed efforts		
<b><i>Congressional Add:</i></b> Program Increase - Directed Energy Experimentation	0.000	5.000
<b><i>FY 2019 Accomplishments:</i></b> Not Applicable		
<b><i>FY 2020 Plans:</i></b> Conduct Congressionally-directed efforts		
<b>Congressional Adds Subtotals</b>	0.000	105.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Experimentation campaigns will aid the advancement and transition of advanced technologies by providing the credible evidence decision makers need to make sound strategic decisions and investment choices, to provide the warfighter with advanced capabilities. The Air Force Capability Development Council, Air Force Warfighting Integration Capability, and/or SAF/AQ directs experimentation campaigns. The Air Force Strategic Development Planning and Experimentation (SDPE) Office located at Wright-Patterson Air Force Base, Ohio manages and executes each experimentation campaign. Contracting strategies vary based on the activities of each campaign.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / Tech Transition Program	<b>Project (Number/Name)</b> 645350 / Experimentation
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Experimentation Campaigns	C/Various	Various : Various	-	10.398	Mar 2019	14.000	Mar 2020	69.141	Mar 2021	-		69.141	Continuing	Continuing	-
Experimentation Campaign: Commercial Space Internet/Global Lightning	C/CPFF	Various : Various	-	11.623	Mar 2019	-		-		-		-	0.000	11.623	-
Experimentation Campaign: Hawkeye Contract 1	C/CPFF	L3 : Salt Lake City, UT	-	2.080	Apr 2019	8.453	Feb 2020	-		-		-	Continuing	Continuing	-
Experimentation Campaign: Hawkeye Contract 2	C/CPFF	Lockheed : Forth Worth, TX	-	0.900	Apr 2019	2.673	Jan 2020	-		-		-	Continuing	Continuing	-
Experimentation Campaign: Hawkeye Contract 3	C/CPFF	Northrup Grumman : San Diego, CA	-	1.499	May 2019	4.500	Mar 2020	-		-		-	Continuing	Continuing	-
Experimentation Campaign: Directed Energy	C/Various	Various : Various	-	15.456	May 2019	12.300	Feb 2020	-		-		-	Continuing	Continuing	-
Experimentation Campaign: Hawkeye Contract 4	C/CPFF	Space X : Hawthorne, CA	-	14.214	May 2019	1.865	Feb 2020	-		-		-	Continuing	Continuing	-
Experimentation Campaign: Advanced Attributable Aircraft	Various	Various : Various	-	9.556	Jul 2019	25.000	Jun 2020	-		-		-	Continuing	Continuing	-
Experimentation Campaign: Hawkeye Contract 5	C/Various	Various : Various	-	-		2.600	Feb 2020	-		-		-	Continuing	Continuing	-
Congressional Add - Directed Energy Experimentation	Various	Various : Various	-	-		5.000	Apr 2020	-		-		-	0.000	5.000	-
Congressional Add - Low Cost Attributable Aircraft Technology	Various	Various : Various	-	-		100.000	Jul 2020	-		-		-	0.000	100.000	-
<b>Subtotal</b>			-	65.726		176.391		69.141		-		69.141	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / Tech Transition Program	<b>Project (Number/Name)</b> 645350 / Experimentation
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

**Remarks**  
Experimentation is focused on rapid learning and then pivoting based on that learning. Therefore, specific plans are not detailed to prevent locking into an approach that will likely shift based on current experimentation efforts. Further budget details can be provided in the appropriate forum.

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Experimentation Campaign Support	Various	Various : Various	-	0.000	Jul 2019	0.800	Jan 2020	1.520	Dec 2020	-		1.520	Continuing	Continuing	-
Experimentation Campaign: Directed Energy Modeling and Simulation Support, Data Analysis and Vignette Support	MIPR	AFRL : WPAFB, OH	-	5.858	Mar 2019	3.700	Mar 2020	-		-		-	0.000	9.558	-
Hawkeye Experimentation Campaign Support	MIPR	Various : Various	-	0.308	Mar 2019	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	6.166		4.500		1.520		-		1.520	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Experimentation Campaign Test and Evaluation	MIPR	Various : Various	-	-		1.000	Feb 2020	5.000	Mar 2021	-		5.000	Continuing	Continuing	-
Directed Energy Experimentation Government Modeling and Test Planning Support	MIPR	AFRL : Kirtland, NM	-	2.801	Feb 2019	-		-		-		-	0.000	2.801	-
Hawkeye Test and Evaluation Support	MIPR	Various : Various	-	0.800	Mar 2019	1.000	Feb 2020	-		-		-	0.000	1.800	-
Commercial Space Internet Government Test	MIPR	Various : Various	-	0.377	Feb 2019	-		-		-		-	0.000	0.377	-



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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Air Force</b>	<b>Date: February 2020</b>
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<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>	<b>Project (Number/Name)</b> 645350 / <i>Experimentation</i>
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<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>				
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Subtotal</b>			-	3.978		2.000		5.000		-		5.000		Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>				
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Directed Energy Campaign Program Management Administration Costs	Various	Various : Various	-	0.360	Aug 2019	0.000		0.000		-		0.000		0.000	0.360	-
Experimentation Campaign Contractor Support	Various	Various : Various	-	5.059	Mar 2019	1.507	Mar 2020	2.970	Mar 2021	-		2.970		Continuing	Continuing	-
Experimentation Campaign Program Management Administration Costs	Various	Various : Various	-	2.890	Aug 2019	2.400	Aug 2020	2.891	Feb 2021	-		2.891		Continuing	Continuing	-
<b>Subtotal</b>			-	8.309		3.907		5.861		-		5.861		Continuing	Continuing	N/A

	<b>Prior Years</b>	<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>		-	84.179		186.798		81.522		-	81.522	Continuing	Continuing	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>	<b>Project (Number/Name)</b> 645350 / <i>Experimentation</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Experimentation</b>																												
Experimentation Campaigns																												
<b>Directed Energy Experimentation Campaign</b>																												
Directed Energy Campaign																												
<b>Commercial Space Internet</b>																												
Commercial Space Internet Experimentation																												
<b>Advanced Attributable Aircraft</b>																												
Advanced Attributable Aircraft Experimentation																												
<b>Hawkeye</b>																												
Hawkeye Experimentation																												
<b>Congressional Add Directed Energy</b>																												
Directed Energy Experimentation																												
<b>Congressional Add Low Cost Attributable Aircraft Technology</b>																												
Low Cost Attributable Aircraft Technology																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>	<b>Project (Number/Name)</b> 645350 / <i>Experimentation</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Experimentation</b>				
Experimentation Campaigns	1	2019	4	2025
<b>Directed Energy Experimentation Campaign</b>				
Directed Energy Campaign	1	2019	4	2020
<b>Commercial Space Internet</b>				
Commercial Space Internet Experimentation	1	2019	4	2021
<b>Advanced Attributable Aircraft</b>				
Advanced Attributable Aircraft Experimentation	1	2020	4	2020
<b>Hawkeye</b>				
Hawkeye Experimentation	1	2020	4	2020
<b>Congressional Add Directed Energy</b>				
Directed Energy Experimentation	1	2020	4	2020
<b>Congressional Add Low Cost Attributable Aircraft Technology</b>				
Low Cost Attributable Aircraft Technology	1	2020	4	2020

**Note**

Experimentation is focused on rapid learning and then pivoting based on that learning. Therefore, specific plans are not detailed to prevent locking into an approach that will likely shift based on current experimentation efforts. Further schedule details regarding individual experimentation campaigns can be provided in the appropriate forum.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>				<b>Project (Number/Name)</b> 645351 / <i>Prototyping</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
645351: <i>Prototyping</i>	-	78.953	128.128	137.730	0.000	137.730	175.884	73.710	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Prototyping project enables integration and demonstration of emerging technologies in an operational or operational-like environment in order to capitalize on successful research and development efforts with high warfighter priority. Integration and demonstration of prototypes also allow leadership to make informed strategy and resource decisions based on the results of such prototype demonstrations. Prototyping efforts funded in this project capitalize on various emerging warfighter technology areas such as communications, cyber weapons, or novel aircraft technology.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Lifecycle Prototyping	49.963	73.128	137.730
<b>Description:</b> Lifecycle prototyping, product support and sustainment technologies.			
<b>FY 2020 Plans:</b> Continue Spectral Halo Pod prototyping effort to enable multi-generation aircraft to employ multiple domain effects to disrupt, degrade, and collapse adversarial targets. Continue space internet prototyping effort to enable broad connectivity across multiple platforms. Additional prototyping activities for emerging technologies may be based on Department guidance.			
<b>FY 2021 Plans:</b> Continue space internet prototyping effort to enable broad connectivity across multiple platforms. Conduct game-changing technology prototyping efforts to enable collaborative weapons and platforms capabilities for the future force. Additional prototyping activities for emerging technologies may be conducted in support of the strategic capabilities identified in the Air Force Science and Technology Strategy: global persistent awareness; resilient information sharing; rapid, effective decision-making; complexity, unpredictability, and mass; and speed and reach of disruption and lethality.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 increased compared to FY 2020 by \$64.602 million. Funding increased due to the addition of game changing technology prototyping efforts.			
<b>Accomplishments/Planned Programs Subtotals</b>	49.963	73.128	137.730
	<b>FY 2019</b>	<b>FY 2020</b>	
<b>Congressional Add:</b> Program Increase - Alternative Energy Research	4.832	0.000	

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force		Date: February 2020	
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)	
3600 / 4	PE 0604858F / Tech Transition Program	645351 / Prototyping	
		<b>FY 2019</b>	<b>FY 2020</b>
<b>FY 2019 Accomplishments:</b> Conducted Congressionally-directed efforts			
<b>FY 2020 Plans:</b> Not Applicable			
<b>Congressional Add:</b> Program Increase - Laser Coating Removal Technology		9.663	0.000
<b>FY 2019 Accomplishments:</b> Conducted Congressionally-directed efforts			
<b>FY 2020 Plans:</b> Not Applicable			
<b>Congressional Add:</b> Program Increase - Health and Logistics Management Technology		4.832	0.000
<b>FY 2019 Accomplishments:</b> Conducted Congressionally-directed efforts			
<b>FY 2020 Plans:</b> Not Applicable			
<b>Congressional Add:</b> Program Increase - Competitively Awarded Technology Transition Initiatives		9.663	0.000
<b>FY 2019 Accomplishments:</b> Conducted Congressionally-directed efforts			
<b>FY 2020 Plans:</b> Not Applicable			
<b>Congressional Add:</b> Program Increase - Rapid Sustainment Office		0.000	20.000
<b>FY 2019 Accomplishments:</b> Not Applicable			
<b>FY 2020 Plans:</b> Conduct Congressionally-directed efforts			
<b>Congressional Add:</b> Program Increase - Reliable Power for Critical Infrastructure		0.000	6.000
<b>FY 2019 Accomplishments:</b> Not Applicable			
<b>FY 2020 Plans:</b> Conduct Congressionally-directed efforts			
<b>Congressional Add:</b> Program Increase - Logistics Technologies		0.000	5.000
<b>FY 2019 Accomplishments:</b> Not Applicable			
<b>FY 2020 Plans:</b> Conduct Congressionally-directed efforts			
<b>Congressional Add:</b> Program Increase - Small Satellite Manufacturing		0.000	8.000
<b>FY 2019 Accomplishments:</b> Not Applicable			
<b>FY 2020 Plans:</b> Conduct Congressionally-directed efforts			
<b>Congressional Add:</b> Program Increase - Advanced Repair and Qualification Processes		0.000	6.000

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>	<b>Project (Number/Name)</b> 645351 / <i>Prototyping</i>
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	FY 2019	FY 2020
<b>FY 2019 Accomplishments:</b> Not Applicable		
<b>FY 2020 Plans:</b> Conduct Congressionally-directed efforts		
<b>Congressional Add:</b> Program Increase - Additive Manufacturing	0.000	10.000
<b>FY 2019 Accomplishments:</b> Not Applicable		
<b>FY 2020 Plans:</b> Conduct Congressionally-directed efforts		
<b>Congressional Adds Subtotals</b>	28.990	55.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

For Spectral Halo, the Air Force awarded to existing cost plus type contracts with Herrick Technology Laboratories, Inc (MD), Northeast Information Discovery, Inc (NY), Advanced Geolocation Solutions, Inc (VA), and Mitre, (MA). Follow on contracts planned in 3rd quarter FY 2019 and 2nd quarter FY 2020 to accelerate prototyping.

For Low Cost Attributable Aircraft Technology, the Air Force leveraged the Defense Innovation Unit Experimental Other Transaction Authority to award a Firm Fixed Price Contract to the following contractors: Lockheed Martin, Aurora, Autonodyne, Venator, and Fregata.

Acquisition strategies for other prototypes from Congressional adds and OCO funding vary based on the activities of each prototype.

Miscellaneous emerging prototyping will be based on guidance from Department leadership.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / Tech Transition Program	<b>Project (Number/Name)</b> 645351 / Prototyping
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Spectral Halo Pod: Rapid Prototype of Aircraft Stores	C/CPFF	Various : Various	-	25.953	Apr 2019	12.500	Mar 2020	-		-		-	0.000	38.453	-
Spectral Halo Pod: Rapid Prototyping of UAV Payloads	C/CPFF	Various : Various	-	-		4.000	Oct 2019	-		-		-	0.000	4.000	-
Low-Cost Attributable Aircraft Technology Prototyping	Various	Various : Various	-	11.872	Jan 2019	-		-		-		-	0.000	11.872	-
Commercial Space Internet Prototyping: Global Lightning Contract 1	C/FFP	SpaceX : Hawthorne, CA	-	12.138	Jan 2019	-		-		-		-	0.000	12.138	-
Commercial Space Internet Prototyping: Global Lightning Contract 2	C/CPFF	Space X : Hawthorne, CA	-	-		10.611	Mar 2020	-		-		-	0.000	10.611	-
Commercial Space Internet Prototyping: Global Lightning Contract 3	C/CPFF	Various : Various	-	-		-		37.317	Feb 2021	-		37.317	Continuing	Continuing	-
Commercial Space Internet Prototyping: Global Lightning Contract 4	C/CPFF	Northrup Grumman : San Diego, CA	-	-		5.500	Mar 2020	-		-		-	0.000	5.500	-
Commercial Space Internet Prototyping: Global Lightning Contract 5	C/CPFF	L3 : Salt Lake City, UT	-	-		2.272	Jul 2020	-		-		-	0.000	2.272	-
Congressional Add - Alternate Energy Reserach	Various	Various : Various	-	4.832	Sep 2019	-		-		-		-	0.000	4.832	-
Congressional Add Laser Coating Removal Technology	Various	Various : Various	-	9.663	Feb 2019	-		-		-		-	0.000	9.663	-
Congressional Add Health and Logistics Management Technology	Various	Various : Various	-	4.832	Feb 2019	-		-		-		-	0.000	4.832	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>	<b>Project (Number/Name)</b> 645351 / <i>Prototyping</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Congressional Add Competitively Awarded Technology Transition Initiatives	Various	Various : Various	-	9.663	Jul 2019	-		-		-		-	0.000	9.663	-
Game Changing Technologies	TBD	TBD : TBD	-	-		-		100.413	Mar 2021	-		100.413	Continuing	Continuing	-
Congressional Add Rapid Sustainment Office	Various	Various : Various	-	-		20.000	Jul 2020	-		-		-	0.000	20.000	-
Congressional Add Reliable Power for Critical Infrastructure	Various	Various : Various	-	-		6.000	Jun 2020	-		-		-	0.000	6.000	-
Congressional Add Logistics Technologies	Various	Various : Various	-	-		5.000	Jun 2020	-		-		-	0.000	5.000	-
Congressional Add Small Satellite Manufacturing	Various	Various : Various	-	-		8.000	Jun 2020	-		-		-	0.000	8.000	-
Congressional Add Advanced Repair and Qualification Process	Various	Various : Various	-	-		6.000	Jul 2020	-		-		-	0.000	6.000	-
Congressional Add Additive Manufacturing	Various	Various : Various	-	-		10.000	May 2020	-		-		-	0.000	10.000	-
Mobile Counter-UAS Airborne Payload Suite OCO	C/TBD	TBD : TBD	-	0.000		7.800	Jun 2020	0.000		-		0.000	0.000	7.800	-
Integrated Expeditionary Counter-Unmanned Aerial System OCO	C/TBD	TBD : TBD	-	0.000		2.000	Jun 2020	0.000		-		0.000	0.000	2.000	-
Persistent Overhead Surveillance/ Reconnaissance for Special Operations OCO	C/TBD	TBD : TBD	-	0.000		10.300	Jun 2020	0.000		-		0.000	0.000	10.300	-
Overhead Surveillance/ Reconnaissance for Special Operations OCO	C/TBD	TBD : TBD	-	0.000		5.600	Jun 2020	0.000		-		0.000	0.000	5.600	-
Instant Fuel Leak Repair OCO	C/TBD	TBD : TBD	-	0.000		0.750	Jun 2020	0.000		-		0.000	0.000	0.750	-



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / Tech Transition Program	<b>Project (Number/Name)</b> 645351 / Prototyping
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
<b>Subtotal</b>			-	78.953		116.333		137.730		-		137.730	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Spectral Halo Pod: Rapid Prototyping of Aircraft Stores Support	MIPR	AFRL : Bedford, MA	-	-		1.200	Feb 2020	-		-		-	0.000	1.200	-
Spectral Halo Pod: Rapid Prototyping of UAV Payloads Support	C/Various	AFRL : Rome, NY	-	-		2.500	Feb 2020	-		-		-	0.000	2.500	-
Global Lightning/ Commercial Space Support	MIPR	RAND : Santa Monica, CA	-	-		0.700	Feb 2020	-		-		-	0.000	0.700	-
<b>Subtotal</b>			-	-		4.400		-		-		-	0.000	4.400	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Spectral Halo Pod: Rapid Prototyping of Aircraft Stores Support	MIPR	AFRL : Patuxent River, MD	-	-		0.200	Feb 2020	-		-		-	0.000	0.200	-
Spectral Halo Pod: Rapid Prototyping of UAF Payloads Support	C/Various	Various : Various	-	-		5.000	Mar 2020	-		-		-	0.000	5.000	-
Global Lightning/ Commercial Space Internet	MIPR	Various : Various	-	-		1.876	Mar 2020	-		-		-	0.000	1.876	-
<b>Subtotal</b>			-	-		7.076		-		-		-	0.000	7.076	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>	<b>Project (Number/Name)</b> 645351 / <i>Prototyping</i>
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Spectral Halo Pod: Rapid Prototyping of Aircraft Stores Support	MIPR	AFRL : Arlington, VA	-	-		0.100	Oct 2019	-		-		-	0.000	0.100	-
Spectral Halo Pod: Rapid Prototyping of UAV Payloads Support	MIPR	AFRL : Arlington, VA	-	-		0.100	Feb 2020	-		-		-	0.000	0.100	-
Global Lightning/ Commercial Space Internet	Various	Various : Various	-	-		0.119	Mar 2020	-		-		-	0.000	0.119	-
<b>Subtotal</b>			-	-		0.319		-		-		-	0.000	0.319	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	78.953	128.128	137.730	-	137.730	Continuing	Continuing	N/A

**Remarks**  
Additional details, including Spectral Halo, low-cost attritable aircraft technology, space internet prototyping, and other emerging prototyping efforts, can be provided in the appropriate forum.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / Tech Transition Program	<b>Project (Number/Name)</b> 645351 / Prototyping
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Lifecycle Prototyping</b>	
Spectral Halo Pod	[REDACTED]
Low-Cost Attributable Aircraft Technology (LCAAT)	[REDACTED]
Commercial Space Internet	[REDACTED]
Congressional Add - Alternative Energy Research	[REDACTED]
Congressional Add - Laser Coating Removal Technology	[REDACTED]
Congressional Add - Health and Logistics Management Technology	[REDACTED]
Congressional Add - Competitively Awarded Technology Transition Initiatives	[REDACTED]
Game Changing Technologies	[REDACTED]
Emerging Prototypes as directed	[REDACTED]
OCO - Mobile Counter-UAS Airborne Payload Suite	[REDACTED]
OCO - Integrated Expeditionary Counter Unmanned Aerial Systems	[REDACTED]
OCO - Persistent Overhead Surveillance/ Reconnaissance for Special Operations	[REDACTED]
OCO - Overhead Surveillance/ Reconnaissance for Special Operations	[REDACTED]
OCO - Instant Curing Fuel Leak Repair Technology	[REDACTED]
Congressional Add - Rapid Sustainment Office	[REDACTED]

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>	<b>Project (Number/Name)</b> 645351 / <i>Prototyping</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Congressional Add - Reliable Power for Critical Infrastructure					██████████																							
Congressional Add - Logistics Technologies					██████████																							
Congressional Add - Small Satellite Manufacturing					██████████																							
Congressional Add - Advanced Repair and Qualification Processes					██████████																							
Congressional Add - Additive Manufacturing					██████████																							

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604858F / <i>Tech Transition Program</i>	<b>Project (Number/Name)</b> 645351 / <i>Prototyping</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Lifecycle Prototyping</i></b>				
Spectral Halo Pod	1	2019	4	2020
Low-Cost Attritable Aircraft Technology (LCAAT)	1	2019	4	2019
Commercial Space Internet	1	2019	4	2022
Congressional Add - Alternative Energy Research	2	2019	4	2019
Congressional Add - Laser Coating Removal Technology	1	2019	4	2019
Congressional Add - Health and Logistics Management Technology	1	2019	4	2019
Congressional Add - Competitively Awarded Technology Transition Initiatives	1	2019	4	2019
Game Changing Technologies	1	2021	4	2023
Emerging Prototypes as directed	1	2019	4	2023
OCO - Mobile Counter-UAS Airborne Payload Suite	1	2020	4	2020
OCO - Integrated Expeditionary Counter Unmanned Aerial Systems	1	2020	4	2020
OCO - Persistent Overhead Surveillance/Reconnaissance for Special Operations	1	2020	4	2020
OCO - Overhead Surveillance/Reconnaissance for Special Operations	1	2020	4	2020
OCO - Instant Curing Fuel Leak Repair Technology	1	2020	4	2020
Congressional Add - Rapid Sustainment Office	1	2020	4	2020
Congressional Add - Reliable Power for Critical Infrastructure	1	2020	4	2020
Congressional Add - Logistics Technologies	1	2020	4	2020
Congressional Add - Small Satellite Manufacturing	1	2020	4	2020
Congressional Add - Advanced Repair and Qualification Processes	1	2020	4	2020
Congressional Add - Additive Manufacturing	1	2020	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605230F / <i>Ground Based Strategic Deterrent</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	474.169	401.244	557.495	1,524.759	0.000	1,524.759	2,536.450	3,034.370	3,072.837	3,031.610	7,327.795	21,960.729
641025: <i>GROUND BASED STRATEGIC DETERRENT (GBSD)</i>	474.169	401.244	557.495	1,524.759	0.000	1,524.759	2,536.450	3,034.370	3,072.837	3,031.610	7,327.795	21,960.729
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 493

**A. Mission Description and Budget Item Justification**

The Ground Based Strategic Deterrent (GBSD) program will design, develop, produce and deploy a replacement for the current Minuteman III (MM III) Intercontinental Ballistic Missile (ICBM) weapon system in order to maintain a safe, secure, reliable, and effective nuclear deterrent. The GBSD program will deliver a fully integrated weapon system beginning in Fiscal Year 2029 to lower lifecycle costs and to close key capability gaps and vulnerabilities identified in the GBSD Capabilities Based Assessment, GBSD Capabilities Development Document, and the GBSD Analysis of Alternatives. GBSD will also mitigate ground-based deterrent degradation due to MM III component age-out and attrition.

The GBSD program will include prime contractor development of applicable support equipment, data, flight test hardware and infrastructure, and training material while examining and mitigating risk during the MM III to GBSD transition. This program includes any needed nuclear surety and certification and system vulnerability assessments.

The major activities during Technology Maturation and Risk Reduction phase for the GBSD program include 1) government system engineering, analytics, and test capability development; 2) air vehicle equipment risk reduction; 3) command & launch risk reduction; 4) launch systems risk reduction; 5) support systems risk reduction; and 6) weapon system integration risk reduction.

During the Engineering and Manufacturing Development phase, the GBSD program will execute 1) government system engineering, analytics, and test capability development; 2) air vehicle equipment development; 3) command & launch systems development; 4) launch systems development; 5) support systems development; and 6) weapon system integration.

Government systems engineering investments include development of model-based systems engineering (MBSE), integration, test software, product life-cycle management framework, and modernization of existing system engineering labs and infrastructure. Air vehicle equipment is an integrated missile stack which includes the propulsion, post-boost, guidance, and re-entry systems sub-components. Command & launch encompasses all command and control components and interfaces, associated ground hardware, ground control equipment and associated software directly related to the survivability, monitoring, and launch of the replacement flight system. Launch systems include launch control center, launch facility restoration, modernization of real property, and structures and associated ground mechanical systems. Support systems include operator and maintenance trainer hardware and software, security system architecture, and transport support equipment, program

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605230F / <i>Ground Based Strategic Deterrent</i>
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office and weapon system facilities, and common support equipment. Weapon system integration risk reduction includes non-proprietary open systems architecture with well-defined interfaces and a modular design at the weapon system level to allow future modification and technology insertion.

The significant increase in funding required for FY21 and beyond is to execute the Engineering & Manufacturing Development (EMD) Contract to advance GBSD major activities to include systems engineering activities, information technology, data management, analytical capabilities and deliver a flexible, integrated weapon system critical design. The program will modify, modernize, and expand the analytic environment and labs to support EMD activities to enable full execution of the program's capability to own the technical baseline throughout the program life cycle. This involves establishing a digital engineering system including a supporting environment/infrastructure to perform digital activities, collaborate with, and communicate across stakeholders. Based on success during the Technology Maturation & Risk Reduction contract, this program will continue to examine and mature air vehicle equipment, command and launch, cybersecurity, operator and maintenance trainer hardware and software, security system architecture, transport sub-systems, and associated ground technologies. The program will also continue to mature and refine weapon system and non-operational software, software integration and development, modular system architecture requirements, and product life-cycle management. This will continue to require execution and improvement to the unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements. The program will also expand and mature the analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and securely transmitted between government and contractors. The program will continue to develop Vandenberg AFB test capabilities and ensure Western Range Test capabilities for the Flight Test Program. The program will also continue integrating requirement for dual-capable, air-based, survivable launch capability. Finally, the program will establish a government-owned and government-operated DevSecOps/software stack.

This program element includes necessary civilian pay expenses required to manage, execute, and deliver GBSD weapon system capability. The use of such program funds is in addition to the civilian pay expenses budgeted in program elements 0605831F or 0605833F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	414.441	570.373	1,527.545	0.000	1,527.545
Current President's Budget	401.244	557.495	1,524.759	0.000	1,524.759
Total Adjustments	-13.197	-12.878	-2.786	0.000	-2.786
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-100.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	65.100			
• Congressional Directed Transfers	0.000	22.022			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-13.197	0.000			
• Other Adjustments	0.000	0.000	-2.786	0.000	-2.786



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605230F / <i>Ground Based Strategic Deterrent</i>
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<b>Congressional Add Details (\$ in Millions, and Includes General Reductions)</b>	FY 2019	FY 2020
<b>Project:</b> 641025: <i>GROUND BASED STRATEGIC DETERRENT (GBSD)</i>		
Congressional Add: <i>Congressional Add- Risk Reduction</i>	0.000	65.100
Congressional Add: <i>Congressional Directed Transfer- SLP-A</i>	0.000	22.022
Congressional Add Subtotals for Project: 641025		
	0.000	87.122
Congressional Add Totals for all Projects		
	0.000	87.122

**Change Summary Explanation**

FY 2019 funding reflects a Small Business Innovation Research adjustment of \$13.197 million.  
 FY 2020 funding reflects a Congressional directed reduction of \$100 million for "TMRR contract funding excess to need." FY2020 also includes a Congressional Add of \$65.1 million for "Risk Reduction" and a \$22.022 million Congressional Directed Transfer.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
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<p><b>Title:</b> Technology Maturation &amp; Risk Reduction (TMRR)</p> <p><b>Description:</b> The objectives of TMRR for GBSD are 1) advance GBSD major activities, systems engineering activities, trade-studies, information technology, data management, analytical capabilities and deliver a modular, integrated weapon system preliminary design; and 2) mature technologies related to the major activities and demonstrate performance of sub-system capabilities through prototyping, modeling, and simulation.</p> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Modify, modernize, and expand the analytic environment and labs to support the conclusion of TMRR and the transition to Engineering and Manufacturing Development (EMD) activities to enable full execution of the program's capability to own the technical baseline throughout the program life cycle. This involves establishing a digital engineering system including a cloud-enabled environment to perform digital activities, collaborate with, and communicate across stakeholders.</li> <li>• Continue to examine and mature air vehicle equipment, command &amp; launch, cybersecurity, operator and maintenance trainer hardware and software, security system architecture, transport sub-systems, and associated ground technologies. Define requirements and modular architectures through trade studies, prototyping, demonstration, and analysis.</li> <li>• Continue to mature and refine weapon system and non-operational software, software integration and development, modular system architecture requirements, and product life-cycle management.</li> <li>• Continue to mature the assessment of the current MM III launch systems to determine, through on-site assessments and analysis, the extent of degradation and evaluate for future upgrade, replacement, preparation, and modernization of operational and test facilities.</li> </ul>	401.244	361.705	0.000
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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0605230F / <i>Ground Based Strategic Deterrent</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>• Continue to mature the weapon system preliminary design and reduce integration risk by conducting trade studies, system engineering, test activities, and system modeling and simulation.</li> <li>• Continue to further develop analytical, information technology, and data management capabilities to ensure weapon system design information dissemination between government and contractors.</li> <li>• Implement information systems and information technology design to support enterprise operations and TMRR closure.</li> <li>• Modify and expand GBSD workspace infrastructure to accommodate a growing workforce.</li> <li>• Continue to assess the fielding implications for air vehicle equipment, and command &amp; launch and appropriate timelines to transition from MM III to GBSD solution.</li> <li>• Conduct planning for the use of MBSE tools during Operations and Sustainment phase in order to transform ICBM sustainment and supply chain management; and to aid in the migration and analysis of Minuteman III data to GBSD.</li> <li>• Complete Software Specification Review, 9th Quarter Technical Interchange Meeting, and the Preliminary Design Review.</li> <li>• Develop and execute a unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements.</li> <li>• Expand and develop analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and securely transmitted between government and contractors.</li> <li>• Increase Federally Funded Research and Development Center (FFRDC) support to maintain the ability to own the technical baseline.</li> <li>• Continue to refine Security Classification Guide, update impacts, and implement updates and changes through all Government and contractor programmatic activities.</li> <li>• Establish government-owned and government-operated DevSecOps/software stack.</li> </ul> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to completion of Technology Maturation and Risk Reduction in fourth quarter of Fiscal Year 2020.</p>				
<p><b>Title:</b> Engineering &amp; Manufacturing Development (EMD)</p> <p><b>Description:</b> The objectives of EMD for GBSD are as follows: 1) advance GBSD major activities, systems engineering activities, information technology, data management, analytical capabilities and deliver a flexible, integrated weapon system critical design, 2) prototype and test mature technologies related to the major activities and demonstrate performance of sub-system and system capabilities through prototyping and testing and 3) engage in rapid prototyping events to mature future design increments.</p> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Conduct source selection to award EMD contract in 4QFY20.</li> <li>• Implement information systems and information technology design to support EMD execution.</li> </ul>		0.000	108.668	1,524.759

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605230F <i>I Ground Based Strategic Deterrent</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>• Modify and expand GBSD workspace infrastructure to accommodate a growing workforce.</li> <li>• Initiate development of Vandenberg AFB Test capabilities and ensure Western Range Test capabilities for the Flight Test Program.</li> </ul> <p><b><i>FY 2021 Plans:</i></b></p> <ul style="list-style-type: none"> <li>• Execute the EMD Contract to advance GBSD major activities to include systems engineering activities, information technology, data management, analytical capabilities and deliver a flexible, integrated weapon system critical design.</li> <li>• Modify, modernize, and expand the analytic environment and labs to support EMD activities to enable full execution of the program's capability to own the technical baseline throughout the program life cycle. This involves establishing a digital engineering system including a supporting environment/infrastructure to perform digital activities, collaborate with, and communicate across stakeholders.</li> <li>• Continue to examine and mature air vehicle equipment, command and launch, cybersecurity, operator and maintenance trainer hardware and software, security system architecture, transport sub-systems, and associated ground technologies. Define requirements and modular architectures through trade studies, prototyping, demonstration, and analysis.</li> <li>• Continue to mature and refine weapon system and non-operational software, software integration and development, modular system architecture requirements, and product life-cycle management.</li> <li>• Continue to mature the assessment of the current MM III launch systems to determine, through onsite assessments and analysis, the extent of degradation and evaluate for future upgrade, replacement, preparation, and modernization of operational and test facilities.</li> <li>• Continue to mature the weapon system by conducting trade studies, system engineering, test activities, and system modeling and simulation.</li> <li>• Continue to further develop analytical, information technology, and data management capabilities.</li> <li>• Implement information systems and information technology design to support EMD execution.</li> <li>• Modify and expand GBSD workspace infrastructure to accommodate a growing workforce.</li> <li>• Continue to assess fielding requirements for air vehicle equipment, command &amp; launch, and launch systems and appropriate timelines to transition from MM III to GBSD solution.</li> <li>• Conduct planning for the use of MBSE tools during Operations and Sustainment phase in order to transform ICBM sustainment and supply chain management.</li> <li>• Continue to execute and improve the unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements.</li> <li>• Expand and mature the analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and securely transmitted between government and contractors.</li> <li>• Continue to refine Security Classification Guide, update impacts, and implement updates and changes through all Government and contractor programmatic activities.</li> </ul>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605230F / <i>Ground Based Strategic Deterrent</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> <li>• Continue to increase FFRDC/UARC support to maintain the ability to own the technical baseline in EMD.</li> <li>• Plan and execute critical software risk reduction activities.</li> <li>• Increase expansion of Information Systems/Information Technology/Information Assurance infrastructure networks and personnel required to support Top Secret, Special Access Programs, and collateral activities and expand capability at mission partner operating locations.</li> <li>• Develop Vandenberg AFB Test capabilities and ensure Western Range Test capabilities for the Flight Test Program.</li> <li>• Continue integrating requirement for dual-capable, air-based, survivable launch capability.</li> <li>• Integrate the Mk-21A Reentry Vehicle (Program 0101328F), ICBM Fuze Modernization (Program 0604933F), and GBSD test programs.</li> <li>• Expand government-owned and government-operated DevSecOps/software stack.</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funds increased due to ramp up of EMD activities in Fiscal Year 2021.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	401.244	470.373	1,524.759

	FY 2019	FY 2020
<p><b>Congressional Add:</b> Congressional Add- Risk Reduction</p> <p><b>FY 2019 Accomplishments:</b> N/A</p> <p><b>FY 2020 Plans:</b> • Develop digital software factory to reduce software development risk</p> <ul style="list-style-type: none"> <li>• Develop GBSD Cloud Infrastructure and initiating DevSecOps deployment</li> <li>• Initiate environmental impact studies</li> <li>• Continue to grow the organization in preparation for EMD</li> <li>• Install critical SAP IT infrastructure to protect nuclear program data</li> <li>• Initiate EMD risk reduction activities, to include Guidance Component Life Testing, Booster Ground Testing, and additional Modeling &amp; Simulation activities</li> </ul>	0.000	65.100
<p><b>Congressional Add:</b> Congressional Directed Transfer- SLP-A</p> <p><b>FY 2019 Accomplishments:</b> N/A</p> <p><b>FY 2020 Plans:</b> • Integrate requirement for dual-capable, air-based, survivable launch capability from the Airborne Launch Control System-Replacement (ALCS-R) program, previously budgeted in Program 0101213F, Project 672983.</p>	0.000	22.022
<b>Congressional Adds Subtotals</b>	0.000	87.122

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605230F / <i>Ground Based Strategic Deterrent</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 PE 0603851F: <i>Intercontinental Ballistic Missile - Dem/Val</i>	24.994	30.969	32.959	-	32.959	55.370	56.088	7.358	7.493	Continuing	Continuing
• MILCON PE 0101233F: <i>GBSD SQUADRONS</i>	0.000	40.000	79.200	-	79.200	214.000	102.400	44.500	75.795	162.315	718.210

**Remarks**

**E. Acquisition Strategy**

The objective of the GBSD program strategy is to deliver a full, integrated weapon system capability that meets Air Force Global Strike Command's Capability Development Document requirements beginning in Fiscal Year 2029. For the EMD phase of this strategy, the Program Office will award an EMD contract in 4QFY20. The objectives of EMD for GBSD are as follows: 1) to deliver low-risk, technologically mature, integrated weapon system baseline design; 2) develop flexible system architecture with options for future on-ramps and off-ramps to mitigate program risks; 3) embrace model-based systems engineering (MBSE)/digital engineering to streamline system development activities and time-lines; 4) align contract incentives to mitigate schedule and performance risk; 5) utilize MBSE processes and tools to create schedule margin and pull surety, safety, cyber, and test activities to the left for time certain delivery; 6) ensure government owns key interfaces and data rights; 7) pursue "smart commonality" with Navy, Space, and Missile Defense Agency. The EMD phase will include an EMD Baseline Review, Critical Design Review, First Flight Test, Full Functional System Test, System Qualification/System Verification Review, Nuclear Certification, Developmental Test, Operational Test, and will culminate with early production and weapon system deployment. The program will also assess the cost and schedule risks associated with every requirement. The period of performance for the EMD contract is 4QFY20 to 2QFY28 with 5 option years for early production and deployment. These efforts will ultimately extend the capabilities of the ground-based leg of the nuclear triad through 2075.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Air Force</b>											<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 3600 / 4				<b>R-1 Program Element (Number/Name)</b> PE 0605230F / Ground Based Strategic Deterrent				<b>Project (Number/Name)</b> 641025 / GROUND BASED STRATEGIC DETERRENT (GBSD)							

<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
GBSD TMRR Contractor #1	C/CPFF	Boeing Def, Space, & Sec : Huntsville, AL	110.196	115.789	Oct 2018	9.100	Oct 2019	-		-		-	0.000	235.085	349.160
GBSD TMRR Contractor #2	C/CPFF	Northrup Grumman Sys Corp : El Segundo, CA	129.882	110.315	Oct 2018	88.388	Oct 2019	-		-		-	0.000	328.585	328.585
GBSD EMD Contract	C/CPIF	TBD : TBD	0.000	-		108.668	Aug 2020	1,231.915	Oct 2020	-		1,231.915	14,465.328	15,805.911	-
GBSD Security Classification Guide Compliance	Various	Various : Various	0.000	23.066	Oct 2018	62.018	Oct 2019	-		-		-	0.000	85.084	86.393
<b>Subtotal</b>			240.078	249.170		268.174		1,231.915		-		1,231.915	14,465.328	16,454.665	N/A

**Remarks**

EMD award projected for fourth quarter FY20; increase in FY21 represents an entire year funding requirement.

<b>Support (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
GBSD Integration Support Contract	C/FFP	BAE : Hill AFB, UT	76.313	29.731	Oct 2018	36.824	Oct 2019	35.489	Oct 2020	-		35.489	188.918	367.275	-
GBSD Electronic Parts Strategy and Commonality	MIPR	Naval Surface Warfare Center Crane : Crane, IN	8.977	4.427	Nov 2018	4.000	Nov 2019	4.900	Nov 2020	-		4.900	10.738	33.042	-
GBSD System Engineering and Acquisition Support	MIPR	Aerospace Corporation : El Segundo, CA	8.224	6.404	Nov 2018	6.318	Nov 2019	6.508	Nov 2020	-		6.508	38.489	65.943	-
GBSD Acquisition Support and System Engineering	MIPR	MITRE : Bedford, MA	9.896	6.922	Nov 2018	11.208	Nov 2019	12.000	Nov 2020	-		12.000	50.231	90.257	-
GBSD Technical Area Task Support (TMRR)	MIPR	Air Force Global Strike Command : Barksdale AFB, LA	2.950	-		-		-		-		-	0.000	2.950	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0605230F / <i>Ground Based Strategic Deterrent</i>	<b>Project (Number/Name)</b> 641025 / <i>GROUND BASED STRATEGIC DETERRENT (GBSD)</i>
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GBSD Software Engineering Institute	MIPR	Carnegie Mellon : Pittsburgh, PA	1.601	1.400	Nov 2018	1.402	Nov 2019	2.352	Nov 2020	-		2.352	12.492	19.247	-
GBSD Reentry Systems (RS) FFRDC Support and Analysis	MIPR	Sandia National Laboratories : Various	12.313	6.473	Oct 2018	7.750	Oct 2019	7.750	Oct 2020	-		7.750	35.831	70.117	-
GBSD RS FFRDC Analysis and Acquisition Intelligence Support	MIPR	MIT Lincoln Labs : Lexington, MA	1.427	1.435	Oct 2018	1.026	Oct 2019	0.150	Oct 2020	-		0.150	28.316	32.354	-
GBSD Operations Research Analyst Support	C/FFP	Tecolote Research : Hill AFB, UT	0.239	2.118	Oct 2018	2.230	Oct 2019	3.215	Oct 2020	-		3.215	14.199	22.001	-
GBSD Surety and Certification Engineering Services	C/CPFF	Booz Allen Hamilton : Kirtland AFB, NM	4.251	2.145	Nov 2018	2.720	Nov 2019	3.000	Nov 2020	-		3.000	0.000	12.116	-
GBSD OASIS A&AS Support	C/FPIF	Peerless : Hill AFB, UT	0.012	-		1.144	Nov 2019	-		-		-	0.000	1.156	-
GBSD Technical Design Agent for NC2 Codes/ Crypto	MIPR	Sandia National Labs : Various	0.000	-		8.000	Nov 2019	8.000	Nov 2020	-		8.000	0.000	16.000	-
GBSD Mantech	MIPR	Various : Various	0.000	2.463	Dec 2018	3.525	Dec 2019	7.000	Dec 2020	-		7.000	0.000	12.988	-
GBSD Civilian Manpower	Various	US Gov Civilians : Hill AFB, UT	0.000	6.512	Dec 2018	16.517	Oct 2019	21.360	Oct 2020	-		21.360	0.000	44.389	-
GBSD NEPA Analysis	MIPR	Various : Various	0.000	0.487	Apr 2019	6.700	Apr 2020	3.513	Oct 2020	-		3.513	0.000	10.700	-
GBSD Environment Assessments	MIPR	Various : Various	0.000	-		4.623	Dec 2019	4.365	Dec 2020	-		4.365	0.000	8.988	-
GBSD Enterprise Support	C/Various	Various : Various	0.681	0.021	Oct 2018	0.050	Oct 2019	0.718	Oct 2020	-		0.718	880.885	882.355	-
<b>Subtotal</b>			126.884	70.538		114.037		120.320		-		120.320	1,260.099	1,691.878	N/A

**Remarks**  
 GBSD is spearheading the Owning The Technical Baseline (OTTB) approach for system acquisition. This approach utilizes additional support efforts that would typically be performed by a Prime Contractor thus increasing costs within Cost Category Items.  
 GBSD Reentry Systems (RS) FFRDC Support and Analysis will continue into EMD.  
 GBSD Codes and Crypto designs and develops a certified Nuclear Command and Control cryptographic device using a Technical Design Agent (TDA).  
 GBSD Civilian Manpower increases due to increased DCA allocations in order to support EMD and are in addition to any other planned civilian hiring.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0605230F / Ground Based Strategic Deterrent	<b>Project (Number/Name)</b> 641025 / GROUND BASED STRATEGIC DETERRENT (GBSD)
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

GBSD Civilian Manpower & GBSD Environment Assessments moved from Management Services to Support category as these efforts are not PMA.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GBSD Cybersecurity, Test and Evaluation Framework, Codes/Crypto	MIPR	Johns Hopkins University-Applied Physics Lab : Laurel, MD	12.150	12.600	Oct 2018	13.200	Oct 2019	14.870	Oct 2020	-		14.870	65.463	118.283	-
GBSD Integrated Test Team	PO	Arnold Engineering Development Complex : Arnold AFB, TN	5.125	3.861	Oct 2018	7.462	Oct 2019	20.983	Oct 2020	-		20.983	258.250	295.681	-
GBSD Independent Operational Test Agency	PO	Air Force Operational Test and Evaluation Center : Hill AFB, UT	1.275	1.188	Oct 2018	1.990	Oct 2019	5.756	Oct 2020	-		5.756	209.131	219.340	-
GBSD Integrated Threat Analysis and Simulation Environment (ITASE) 1	MIPR	DIA-Missile and Space Intelligence Center : Redstone Arsenal, AL	4.682	4.779	Oct 2018	5.144	Nov 2019	5.300	Nov 2020	-		5.300	0.000	19.905	-
GBSD ITASE 2	MIPR	National Air and Space Intelligence Center : Fairborn, OH	0.942	-		0.765	Nov 2019	-		-		-	0.000	1.707	-
GBSD Nuclear Dust and Debris Environments Study	MIPR	Air Force Research Lab : Wright Patterson AFB, OH	1.084	1.200	Oct 2018	0.400	Nov 2019	-		-		-	0.000	2.684	-
GBSD RS Test and Advanced Technology Interface (TMRR)	MIPR	Sandia National Labs : Various	1.950	0.274	Oct 2018	-		-		-		-	0.000	2.224	-
GBSD Defense Accelerator (TMRR)	MIPR	Army Research Lab : Adelphi, MD	1.282	0.213	Dec 2018	-		-		-		-	0.000	1.495	-



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<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0605230F / Ground Based Strategic Deterrent	<b>Project (Number/Name)</b> 641025 / GROUND BASED STRATEGIC DETERRENT (GBSD)
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<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>		<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>			
GBSD Launch Systems LF-26 (TMRR)	Various	Various : Various	0.010	0.030	Jan 2019	3.010	Oct 2019	-		-		-	0.000	3.050	-	
GBSD Software Support	PO	309th SMXG : Hill AFB, UT	1.379	4.100	Oct 2018	8.970	Oct 2019	10.000	Oct 2020	-		10.000	631.687	656.136	-	
GBSD Test Vehicles	Various	Various : Various	0.000	-		15.300	Jan 2020	11.000	Jan 2021	-		11.000	123.000	149.300	-	
GBSD Instrument Testing	MIPR	Aerospace Corporation : El Segundo, CA	0.000	2.000	Aug 2019	7.600	Nov 2019	-		-		-	0.000	9.600	-	
GBSD Booster Ground Test	MIPR	Air Force Research Labs : Edwards AFB, CA	0.000	-		7.700	Nov 2019	8.800	Nov 2020	-		8.800	0.000	16.500	-	
GBSD Guidance, Navigation, and Control Instruments for Developmental Testing	MIPR	Various : Various	0.000	-		21.600	Oct 2019	-		-		-	0.000	21.600	-	
GBSD / Missile Defense Agency Silo Fly-out Modelling / Simulation Development	MIPR	Various : Various	0.000	0.900	Aug 2019	5.500	Nov 2019	4.300	Nov 2020	-		4.300	0.000	10.700	-	
GBSD Reentry System / Reentry Vehicle Modelling / Simulation Environment Development	MIPR	National Air and Space Intelligence Center : Fairborn, OH	0.000	0.857	Aug 2019	2.000	Nov 2019	0.895	Nov 2020	-		0.895	0.000	3.752	-	
GBSD Enterprise Test and Assessments	C/Various	Various : Various	3.546	-		-		-		-		-	1,603.571	1,607.117	-	
GBSD Rapid Assessment Technology / LS Support	MIPR	Various : Various	0.000	0.270	Apr 2019	3.506	Apr 2020	1.000	Mar 2021	-		1.000	0.000	4.776	-	
GBSD Joint Test Assembly Encryption	MIPR	Sandia National Labs : Various	0.000	1.500	Jul 2019	3.000	Nov 2019	6.000	Dec 2020	-		6.000	0.000	10.500	-	
GBSD Joint Environment Test Unit / Joint Test Assembly National Nuclear Security Agency Cost Share	MIPR	Sandia National Labs : Various	0.000	1.500	Mar 2019	2.000	Nov 2019	5.000	Dec 2020	-		5.000	0.000	8.500	-	

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0605230F / <i>Ground Based Strategic Deterrent</i>	<b>Project (Number/Name)</b> 641025 / <i>GROUND BASED STRATEGIC DETERRENT (GBSD)</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
<b>Subtotal</b>			33.425	35.272		109.147		93.904		-		93.904	2,891.102	3,162.850	N/A

**Remarks**  
 GBSD Cybersecurity, Test and Evaluation Framework, Codes/Crypto will continue into EMD.  
 GBSD Integrated Test Team will continue to increase Full Time Equivalent (FTE) allocations as GBSD ramps up for EMD.  
 GBSD Independent Operational Test Agency includes planning and design costs for TMRR and EMD. Operational Test costs have been included in the GBSD Enterprise Test and Assessment line item.  
 GBSD Joint Test Assembly Encryption & GBSD Joint Environment Test/Unit/Joint Test Assembly National Nuclear Security Agency Cost Share moved from Support to Test and Evaluation category.  
 GBSD Software Support will continue to increase 309th FTE allocations as GBSD ramps up for EMD  
 GBSD Software Support and GBSD Integrated Test Team total cost increased as requirements have been refined to reflect updated EMD estimate.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GBSD PMA	Various	Various : Various	5.138	7.665	Oct 2018	4.139	Oct 2019	2.255	Oct 2020	-		2.255	66.671	85.868	-
GBSD Integration Support Contract	C/FFP	BAE : Hill AFB, UT	42.939	16.949	Oct 2018	19.828	Oct 2019	19.110	Nov 2020	-		19.110	0.000	98.826	-
GBSD Electronics Parts Strategy and Commonality	C/Various	Naval Surface Warfare Center : Crane, IN	3.847	1.898	Nov 2018	1.000	Nov 2019	2.100	Nov 2020	-		2.100	1.602	10.447	-
GBSD System Engineering and Acquisition Support	C/Various	Aerospace Corporation : El Segundo, CA	10.052	7.828	Nov 2018	7.722	Nov 2019	7.954	Nov 2020	-		7.954	24.460	58.016	-
GBSD IS/IT Support	C/Various	Various : Various	11.806	10.654	Dec 2018	10.761	Oct 2019	4.201	Oct 2020	-		4.201	16.518	53.940	-
GBSD DevSecOps	MIPR	Various : Various	0.000	0.270	Sep 2019	22.687		43.000	Nov 2020	-		43.000	0.000	65.957	-
GBSD Enterprise Infrastructure	C/Various	Various : Various	0.000	1.000	Oct 2018	-		-		-		-	277.282	278.282	-
<b>Subtotal</b>			73.782	46.264		66.137		78.620		-		78.620	386.533	651.336	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0605230F / <i>Ground Based Strategic Deterrent</i>	<b>Project (Number/Name)</b> 641025 / <i>GROUND BASED STRATEGIC DETERRENT (GBSD)</i>
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

**Remarks**  
GBSD is spearheading the Owning The Technical Baseline (OTTB) approach for system acquisition. This approach utilizes additional support and management services that would typically be performed by a Prime Contractor.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	474.169	401.244	557.495	1,524.759	-	1,524.759	19,003.062	21,960.729	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0605230F / <i>Ground Based Strategic Deterrent</i>	<b>Project (Number/Name)</b> 641025 / <i>GROUND BASED STRATEGIC DETERRENT (GBSD)</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Ground Based Strategic Deterrent (GBSD)</b>																												
TMRR Phase																												
9th Quarter Technical Interchange Meeting																												
Software Specification Review																												
Preliminary Design Review (Apr 2020)																												
Milestone B (Aug 2020)																												
EMD Phase																												
Nuclear Safety Design Certification																												
Nuclear Compatibility Certification																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0605230F / <i>Ground Based Strategic Deterrent</i>	<b>Project (Number/Name)</b> 641025 / <i>GROUND BASED STRATEGIC DETERRENT (GBSD)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Ground Based Strategic Deterrent (GBSD)</b>				
TMRR Phase	1	2019	4	2020
9th Quarter Technical Interchange Meeting	1	2020	1	2020
Software Specification Review	2	2020	2	2020
Preliminary Design Review (Apr 2020)	3	2020	3	2020
Milestone B (Aug 2020)	4	2020	4	2020
EMD Phase	4	2020	4	2025
Nuclear Safety Design Certification	1	2021	4	2025
Nuclear Compatibility Certification	1	2021	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0207100F I Light Attack Armed Reconnaissance (LAAR) Squadrons
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	2.000	0.014	0.000	0.014	0.000	0.000	0.000	0.000	0.000	2.014
643730: EO/IR Weather System Dev	-	0.000	0.000	0.007	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.007
643865: Light Attack	-	0.000	2.000	0.007	0.000	0.007	0.000	0.000	0.000	0.000	0.000	2.007

**Note**  
This program, BA 4, PE 0207100F, project 643730, EO/IR Weather System Development, is a new start.

**A. Mission Description and Budget Item Justification**

The Light Attack Aircraft (LAA) platform increases combat capability and readiness at reduced operating costs for missions in permissive environments. LAA executes under a middle tier rapid fielding acquisition strategy pursuant to Section 804 of the FY16 National Defense Authorization Act. The LAA option offers flexibility and accelerates modernization of current and potential partner forces who do not require advanced fighter aircraft. The LAA effort supports the National Defense Strategy to counter violent extremism on a global scale, alongside allies and partners

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	35.000	35.000	0.000	35.000
Current President's Budget	0.000	2.000	0.014	0.000	0.014
Total Adjustments	0.000	-33.000	-34.986	0.000	-34.986
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-33.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-34.986	0.000	-34.986

**Change Summary Explanation**

FY20 Congressional reduction for Restoring acquisition accountability: Unclear acquisition strategy

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>

FY21 Funding transferred to SOCOM



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>					<b>Project (Number/Name)</b> 643730 / <i>EO/IR Weather System Dev</i>		
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
643730: <i>EO/IR Weather System Dev</i>	-	0.000	0.000	0.007	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.007
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 4, PE 0207100F, project 643730, EO/IR Weather System Development, is a new start.

**A. Mission Description and Budget Item Justification**

Based on completion of the Space-Based Environmental Monitoring (SBEM) Joint Requirements Oversight Council (JROC) Memo 092-14, capabilities will be developed to satisfy weather Gap 1 (Cloud Characterization) and Gap 2 (Theater Weather Imagery). Electro-Optical/Infrared (EO/IR) Weather Systems is a component of SBEM efforts to develop capabilities to satisfy weather Gap 1 (Cloud Characterization) and Gap 2 (Theater Weather Imagery). The earliest possible launch options are being integrated in the design for critical gaps.

Based on the SBEM Analysis of Alternatives (AoA) results, the EO/IR Weather Systems (EWS) initial thrusts will enable:

- 1) DoD use of data collected by civil, international and other DoD space systems;
- 2) Timely weather collection of EWS Program of Record;
- 3) Explore and/or utilize the use of commercially available data.

Secondary investments may be supported to address weather gaps identified in the SBEM AoA and validated by the JROC.

EWS will consist of a Low Earth Orbiting (LEO) Freeflyer space vehicle in a sun-synchronous, early morning orbit and a ground architecture (LEO Ground) for mission data retrieval/processing and telemetry, tracking, and control. EWS will provide environmental monitoring in the Electro-Optical/Infrared (EO/IR) Family of Systems providing coverage to meet Space Based Environmental Monitoring (SBEM) Gaps 1 and 2, Cloud Characterization (CC) and Theater Weather Imagery (TWI).

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver EWS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> EO/IR Weather System Development	-	-	0.007
<b>Description:</b> EO/IR Weather System Development			
<b>FY 2021 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	<b>Project (Number/Name)</b> 643730 / <i>EO/IR Weather System Dev</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
EO/IR Weather System Development				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A				
<b>Accomplishments/Planned Programs Subtotals</b>		-	-	0.007
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b> The acquisition strategy for EWS is based on validated SBEM AoA and JROC Memo 033-16 and subsequent acquisition strategy development activities that were conducted in FY 2018. The acquisition strategy for EWS will be finalized in the first quarter of FY 2019 to support an anticipated development RFP release in the second quarter of FY 2019. The program office successfully completed a Materiel Development Decision with the Air Force Program Executive Officer of Space (AFPEO/SP) on 3 May 17, Milestone A and the Acquisition Decision Memorandum on 19 May 17.				

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	<b>Project (Number/Name)</b> 643730 / <i>EO/IR Weather System Dev</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Not specified.	C/CPAF	Not specified. : TBD	-	-		-		0.007		-		0.007	0.000	0.007	-
<b>Subtotal</b>			-	-		-		0.007		-		0.007	0.000	0.007	N/A
			Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	-		0.000		0.007		-		0.007	0.000	0.007	N/A

Remarks

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	<b>Project (Number/Name)</b> 643730 / <i>EO/IR Weather System Dev</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b><i>EO/IR Weather System Development</i></b>																												
EO/IR Weather System Development																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	<b>Project (Number/Name)</b> 643730 / <i>EO/IR Weather System Dev</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>EO/IR Weather System Development</i></b>				
EO/IR Weather System Development	1	2021	4	2021

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	<b>Project (Number/Name)</b> 643865 / <i>Light Attack</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
643865: <i>Light Attack</i>	-	0.000	2.000	0.007	0.000	0.007	0.000	0.000	0.000	0.000	0.000	2.007
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Light Attack Aircraft (LAA) platform increases combat capability and readiness at reduced operating costs for missions in permissive environments. LAA executes under a middle tier rapid fielding acquisition strategy pursuant to Section 804 of the FY16 National Defense Authorization Act. The LAA option offers flexibility and accelerates modernization of current and potential partner forces who do not require advanced fighter aircraft. The LAA effort supports the National Defense Strategy to counter violent extremism on a global scale, alongside allies and partners.

LAA squadrons will provide a deployable and sustainable multirole attack capability, capable of performing a diverse array of attack missions, including but not limited to, Close Air Support (CAS), Armed Reconnaissance, Strike Coordination and Reconnaissance (SCAR), Airborne Forward Air control (FAC-A), and Interdiction. Other tasks for which Light Attack aircraft is expected to be suitable include Combat Search and Rescue (CSAR), Rescue Escort (RESCORT), and Maritime Air Support (MAS). LAA squadrons executing these tasks allows our 4th and 5th Generation fighter fleets to implement a tailored training regimen to address declining core mission readiness and focus on preparing to deter or prevail in conflicts with peer adversaries. LAA will provide a deployable, persistent attack capability that can be employed with low footprint and light logistical support requirements.

Phase III of the Light Attack experiment will seek to identify, assess and mature tactics, techniques, and procedures (TTPs) for coalition low-end counter-land operations, and assess TTPs using various networked capability packages while measuring the success and timeliness of "find-fix-track-target-engage-assess" (F2T2EA) operations.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the Light Attack weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> LAA	0.000	2.000	0.007
<b>Description:</b> Prior Year funding include \$100M of 2018 RDT&E in PE 0604858F 'Tech Transition'. Funds provided to demonstrate, prototype and experiment with technologies and concepts to enable or accelerate their transition to acquisition programs and/or operational use.			
<b>FY 2020 Plans:</b>			

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	<b>Project (Number/Name)</b> 643865 / <i>Light Attack</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
Light Air Attack (LAA) experimentation effort continues with the development of operational tactics of an exportable network with international partners.			
<b><i>FY 2021 Plans:</i></b> N/A - Funding transferred to SOCOM			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Funding Transferred to SOCOM			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	2.000	0.007

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 04 OAX000: <i>Observation Attack Replacement (OA-X)</i>	100.000	210.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	310.000

**Remarks**

**D. Acquisition Strategy**  
The LAA acquisition strategy is anticipated to utilize other transaction agreements for prototyping purposes pursuant to 10 U.S.C. § 2371b.

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**Exhibit R-3, RDT&E Project Cost Analysis:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	<b>Project (Number/Name)</b> 643865 / <i>Light Attack</i>
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	0.000	0.000	-
PMA: Other Govt Cost	Various	Various : Dayton, OH	-	-		2.000	Dec 2019	0.007	Dec 2020	-		0.007	0.000	2.007	-
<b>Subtotal</b>			-	-		2.000		0.007		-		0.007	0.000	2.007	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	-	2.000	0.007	-	0.007	0.000	2.007	N/A

**Remarks**



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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force			Date: February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	<b>Project (Number/Name)</b> 643865 / <i>Light Attack</i>	

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>LAA</b>																												
Experimentation																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	<b>Project (Number/Name)</b> 643865 / <i>Light Attack</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>LAA</b>				
Experimentation	1	2020	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207110F / <i>Next Generation Air Dominance</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	413.938	905.000	1,044.089	0.000	1,044.089	1,542.654	1,706.882	1,264.547	2,073.802	Continuing	Continuing
646007: <i>AS 2030 Air Dominance Technologies (ADT)</i>	-	402.791	905.000	1,044.089	0.000	1,044.089	1,542.654	1,706.882	1,264.547	2,073.802	Continuing	Continuing
646203: <i>Air Dominance Air-to-Air Weapon</i>	-	11.147	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

**Note**

FY19 is the last year of BPAC 646203 funding. It supports Strategic Planning Choices activity through FY20.

**A. Mission Description and Budget Item Justification**

Next Generation Air Dominance (NGAD) is a family of capabilities enabling Air Superiority for the Joint Force in the most challenging operational environments. The program matures technology and reduces risk through prototyping activities and demonstration efforts. Key NGAD attributes include enhancements in survivability, lethality, and persistence across a range of military operations. The NGAD program is directed by Joint Requirements Oversight Council Memorandum (JROCM) 043-13 and CSAF approved Air Superiority Enterprise Capability Collaboration Team (ECCT) Flight Plan. Program activities will also include the pursuit of open architecture solutions including Open Mission Standards (OMS) and Universal Control Interface (UCI) standards management and preplanned product improvements. Funding provides program management support, operational concept exploration, technology studies, multi-domain integration assessments, operational and system architecture development, maturation and risk reduction of air superiority related technologies, including weapons systems and integrated system concept development and demonstration.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver NGAD weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

NGAD civilian pay is executed in PE 020711F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207110F / <i>Next Generation Air Dominance</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	429.610	1,000.000	1,046.000	0.000	1,046.000
Current President's Budget	413.938	905.000	1,044.089	0.000	1,044.089
Total Adjustments	-15.672	-95.000	-1.911	0.000	-1.911
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-95.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-15.672	0.000			
• Other Adjustments	0.000	0.000	-1.911	0.000	-1.911

**Change Summary Explanation**

FY19: -\$15.672M for Small Business Innovative Research (SBIR)

FY20: -\$95.000M Congressional Mark due to cost-risk associated with development profile

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0207110F / <i>Next Generation Air Dominance</i>				<b>Project (Number/Name)</b> 646007 / <i>AS 2030 Air Dominance Technologies (ADT)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
646007: <i>AS 2030 Air Dominance Technologies (ADT)</i>	-	402.791	905.000	1,044.089	0.000	1,044.089	1,542.654	1,706.882	1,264.547	2,073.802	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Next Generation Air Dominance (NGAD) is a family of capabilities enabling Air Superiority for the Joint Force in the most challenging operational environments. The PE matures technology and reduces risk through prototyping activities and demonstration efforts. Key NGAD attributes include enhancements in survivability, lethality, and persistence across a range of military operations. The NGAD program is directed by Joint Requirements Oversight Council Memorandum (JROCM) 043-13 and CSAF approved Air Superiority Enterprise Capability Collaboration Team (ECCT) Flight Plan. Program activities will also include the pursuit of open architecture solutions including Open Mission Standards (OMS) and Universal Control Interface (UCI) standards management and preplanned product improvements. Funding provides program management support, operational concept exploration, technology studies, multi-domain integration assessments, operational and system architecture development, maturation and risk reduction of air superiority related technologies, including weapons systems and integrated system concept development and demonstration.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver NGAD weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

NGAD civilian pay is executed in PE 020711F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> 2030+ Air Dominance	402.791	905.000	1,044.089
<b>Description:</b> The 2030+ Air Dominance (AD) candidate concepts consist of operational analyses, threat studies and technology candidate assessments and prototyping to identify operational concepts and technologies that improve persistence, survivability, lethality, connectivity, interoperability and affordability in 2030 and beyond. These efforts will provide for contractors to conduct analyses, identify technology candidates and perform concept refinement. Furthermore, studies are required to develop operational/system architectures to include family of systems and system of systems. In addition, technical risk reduction activities will be performed to include experimentation, integration and building demonstrative prototypes.			
The 2030+ AD working groups methodically assessed candidate concepts using USAF directives and guidance. Resulting concepts informed the NGAD Analysis of Alternatives (AoA), which was completed in 2019. Ongoing studies are conducted to refine system concepts and operational/system architectures incorporating family of systems and system of systems that may be			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207110F / <i>Next Generation Air Dominance</i>	<b>Project (Number/Name)</b> 646007 / <i>AS 2030 Air Dominance Technologies (ADT)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>required to inform and support strategic choices. In addition, technical risk reduction studies concerning technology integration, operational and system trade space utilizing preliminary data from AD concept development have resulted in multiple activities and engagements to inform strategic USAF experimentation and prototyping efforts. Finally, technical overviews were presented to the Air Force - Scientific Advisory Board (AF-SAB) and other senior leaders.</p> <p><b>FY 2020 Plans:</b> NGAD continues to conduct analyses, identify technology candidates and perform concept refinements. Also continuing the studies required to develop operational/system architectures to include family of systems and system of systems. Technical risk reduction activities continue to include experimentation, integration and building demonstrative prototypes. Program activities also includes the pursuit of open architecture solutions.</p> <p><b>FY 2021 Plans:</b> NGAD will continue to conduct analyses, identify technology candidates and perform concept refinements. Studies required to develop operational/system architectures to include family of systems and system of systems will also mature. Technical risk reduction activities will continue to be performed to include experimentation, integration and building demonstrative prototypes. Program activities will include the pursuit of open architecture solutions.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased due to program increasing technology maturation, risk reduction activities, and hardware prototyping efforts</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	402.791	905.000	1,044.089

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 0207110F/646203: <i>Air Dominance Air-to-Air Weapon</i>	11.147	0.000	0.000	-	0.000	0.000	0.000	-	-	Continuing	Continuing

**Remarks**  
FY19 is the last year of BPAC 646203 funding. It supports Strategic Planning Choices activity through FY20.

**D. Acquisition Strategy**  
The Next Generation Air Dominance acquisition strategy is based on top-down, multi-domain capabilities development planning and oversight framework. Cross-functional teams will conduct analysis, demonstrations, and experiments to quantify the operational value of alternative concepts and technologies to provide solutions to current and future air superiority capability gaps.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207110F / Next Generation Air Dominance	<b>Project (Number/Name)</b> 646007 / AS 2030 Air Dominance Technologies (ADT)
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
NGAD Research/ Development Efforts	Various	Various : Various	-	385.780		876.238		1,010.898		-		1,010.898	Continuing	Continuing	-
<b>Subtotal</b>			-	385.780		876.238		1,010.898		-		1,010.898	Continuing	Continuing	N/A

**Remarks**  
Contractual specifics are not available at this level of security classification.

<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
NGAD Acquisition Support	Various	Various : Various	-	17.011		28.762		33.191		-		33.191	Continuing	Continuing	-
<b>Subtotal</b>			-	17.011		28.762		33.191		-		33.191	Continuing	Continuing	N/A

**Remarks**  
Includes civ pay beginning in FY18

<b>Project Cost Totals</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
	-	402.791	905.000	1,044.089	-	1,044.089	Continuing	Continuing	N/A

**Remarks**  
Details of contract data are not shown because of the level of security classification.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207110F / <i>Next Generation Air Dominance</i>	<b>Project (Number/Name)</b> 646007 / <i>AS 2030 Air Dominance Technologies (ADT)</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>AS 2030 Air Dominance Technologies (ADT)</b>																												
Analysis of Alternatives																												
Concept Exploration																												
Integration Studies																												
Technology Risk Reduction / Prototyping																												
FY21 Strategic Planning Choices Presented																												
FY22 Strategic Planning Choices Presented																												
FY23 Strategic Planning Choices Presented																												
FY24 Strategic Planning Choices Presented																												
FY25 Strategic Planning Choices Presented																												
FY26 Strategic Planning Choices Presented																												
FY27 Strategic Planning Choices Presented																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207110F / <i>Next Generation Air Dominance</i>	<b>Project (Number/Name)</b> 646007 / <i>AS 2030 Air Dominance Technologies (ADT)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>AS 2030 Air Dominance Technologies (ADT)</b>				
Analysis of Alternatives	1	2019	3	2019
Concept Exploration	1	2019	4	2025
Integration Studies	1	2019	4	2025
Technology Risk Reduction / Prototyping	1	2019	4	2025
FY21 Strategic Planning Choices Presented	1	2019	1	2019
FY22 Strategic Planning Choices Presented	1	2020	1	2020
FY23 Strategic Planning Choices Presented	1	2021	1	2021
FY24 Strategic Planning Choices Presented	1	2022	1	2022
FY25 Strategic Planning Choices Presented	1	2023	1	2023
FY26 Strategic Planning Choices Presented	1	2024	1	2024
FY27 Strategic Planning Choices Presented	1	2025	1	2025

**Note**

The NGAD Analysis of Alternatives (AoA) was completed in 2019.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0207110F / Next Generation Air Dominance				<b>Project (Number/Name)</b> 646203 / Air Dominance Air-to-Air Weapon			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
646203: Air Dominance Air-to-Air Weapon	-	11.147	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Next Generation Air Dominance (NGAD) is a family of capabilities enabling Air Superiority for the Joint Force in the most challenging operational environments. The PE matures technology and reduces risk through prototyping activities and demonstration efforts. Key NGAD attributes include enhancements in survivability, lethality, and persistence across a range of military operations. The NGAD program is directed by Joint Requirements Oversight Council Memorandum (JROCM) 043-13 and CSAF approved Air Superiority Enterprise Capability Collaboration Team (ECCT) Flight Plan. Program activities will also include the pursuit of open architecture solutions including Open Mission Standards (OMS) and Universal Control Interface (UCI) standards management and preplanned product improvements. Funding provides program management support, operational concept exploration, technology studies, multi-domain integration assessments, operational and system architecture development, maturation and risk reduction of air superiority related technologies, including weapons systems and integrated system concept development and demonstration.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> AS2030 Weapons	11.147	0.000	0.000
<b>Description:</b> The 2030+ Air Dominance Weapon Systems candidate concepts will develop, refine and integrate technologies into evolving threat scenarios and environments. Funding supports studies that refine system concepts and operational/system architectures to include family of systems and system of systems are required in support of the strategic choices and technical risk reduction activities that include but not limited to experimentation, integration and building demonstrative prototypes.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	11.147	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207110F / <i>Next Generation Air Dominance</i>	<b>Project (Number/Name)</b> 646203 / <i>Air Dominance Air-to-Air Weapon</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 0207110F/646007: 2030+ AIR DOMINANCE AOS	402.791	905.000	1,044.089	-	1,044.089	1,542.654	1,706.882	1,264.547	2,073.802	Continuing	Continuing

**Remarks**

N/A

**D. Acquisition Strategy**

The Next Generation Air Dominance Air-to-Air Weapon acquisition strategy is based on top-down, multi-domain capabilities development planning and oversight framework. Cross-functional teams will conduct analysis, demonstrations, and experiments to quantify the operational value of alternative concepts and technologies to provide solutions to current and future air superiority capability gaps.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Air Force</b>											<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0207110F / Next Generation Air Dominance					<b>Project (Number/Name)</b> 646203 / Air Dominance Air-to-Air Weapon				

<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Research/Development Efforts	Various	Various : Various	-	11.147		-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	11.147		-		-		-		-	Continuing	Continuing	N/A

**Remarks**  
Contractual specifics are not available at this level of security classification.

	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	-	11.147	0.000	-	-	-	Continuing	Continuing	N/A

**Remarks**  
Contractual specifics are not available at this level of security classification.

**UNCLASSIFIED**

<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207110F / <i>Next Generation Air Dominance</i>	<b>Project (Number/Name)</b> 646203 / <i>Air Dominance Air-to-Air Weapon</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b><i>Air Dominance Air-to-Air Weapon</i></b>																												
Analysis of Alternatives																												
Concept Exploration																												
Integration Studies																												
Technical Risk Reduction																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207110F / <i>Next Generation Air Dominance</i>	<b>Project (Number/Name)</b> 646203 / <i>Air Dominance Air-to-Air Weapon</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Air Dominance Air-to-Air Weapon</i></b>				
Analysis of Alternatives	1	2019	3	2019
Concept Exploration	1	2019	4	2019
Integration Studies	1	2019	4	2019
Technical Risk Reduction	1	2019	4	2019

**Note**

- FY19 is last year of BPAC 646203 funding. It supports Strategic Planning Choices activity through FY20
- The NGAD Analysis of Alternatives (AoA) was completed in 2019.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	24.716	23.190	19.356	0.000	19.356	0.000	0.000	0.000	0.000	0.000	67.262
646002: <i>Three Dimensional Expeditionary Long Range Radar</i>	0.000	24.716	23.190	19.356	0.000	19.356	0.000	0.000	0.000	0.000	0.000	67.262
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 393

**A. Mission Description and Budget Item Justification**

The Three-Dimensional Expeditionary Long-Range Radar (3DELRR) will be the principal USAF long-range, ground-based sensor for detecting, identifying, tracking and reporting aerial tracks for the Joint Force Air Component Commander (JFACC) through the Theater Air Control System. The 3DELRR system will provide multiple benefits and increased capabilities to the USAF and to the Joint Services: 1) Replace the aging USAF AN/TPS-75 radar system, which is at the end of its service life and costly to maintain; 2) Detect and track highly maneuverable, small radar cross section air-breathing targets; 3) Mitigate reliability, operational availability, maintainability, transportability and sustainability issues, which plague the AN/TPS-75 radar system; 4) Enable greater battlefield and battlespace awareness through its precise, real-time air picture of sufficient quality to control individual aircraft under a wide range of environmental and operational conditions and 5) Provide exchange of information to the United States Marine Corps, Navy, and Army via appropriate interfaces.

The Air Force conducted a radar market survey in 2019 and identified multiple production-ready alternatives capable of meeting or exceeding 3DELRR requirements at this time. In FY20, the Air Force re-designated 3DELRR as a Middle-Tier Acquisition rapid prototyping effort to demonstrate in FY20 the performance of production-ready systems for meeting 3DELRR requirements.

Based upon the new strategy, the Air Force has removed program funding from fiscal years FY22-FY25 and will use the FY20 prototype capability demonstration results to inform the FY22 budget request.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Three-Dimensional Expeditionary Long-Range Radar weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0207455F I Three Dimensional Long-Range Radar (3DELRR)
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	24.856	37.290	34.196	0.000	34.196
Current President's Budget	24.716	23.190	19.356	0.000	19.356
Total Adjustments	-0.140	-14.100	-14.840	0.000	-14.840
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-14.100			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.140	0.000	-14.840	0.000	-14.840

**Change Summary Explanation**

FY20 funding was reduced by \$14.1M in the FY20 NDAA, line item 52 due to program schedule slip.  
 FY21 funding was reduced by \$14.84M to updated program cost estimate with conclusion of EMD contract.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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<b>Title:</b> Demonstration & Integration of Production-Ready System to meet 3DELRR capabilities	21.053	4.418	12.693
<b>Description:</b> Collaborative acquisition effort to conduct operational assessment - demonstration of viable, production ready prototypes.			
<b>FY 2020 Plans:</b> Activities will include but are not limited to the following: - Continue to lead and manage program through daily interaction with contractors and key stakeholders - Continue efforts for interoperability with external agencies as required - Continue to identify, monitor, mitigate and report program and known risks associated with hardware, software and testing - Continue required system and sub-system certification work - Continue the development of technical manuals and training material - Oversee development of acquisition strategy and technical reviews - Conduct an Industry Day and solicit prototyping proposals - Award Other Transaction Authority (OTA) contract(s) for viable prototypes to meet 3DELRR capability needs - Conduct operationally relevant demonstrations of production-ready systems - Assess viable production-ready prototyping alternatives for potential contract award			



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>- Conduct preparation of production decisions and associated documentation</p> <p><b>FY 2021 Plans:</b> Activities will include but are not limited to the following:</p> <ul style="list-style-type: none"> <li>- Will continue to lead and manage program through daily interaction with contractor and key stakeholders</li> <li>- Will Continue efforts for interoperability with external agencies as required</li> <li>- Will continue to identify, monitor, mitigate and report program and known risks associated with hardware, software and testing</li> <li>- Will continue required system and sub-system certification work</li> <li>- Will continue the development of technical manuals and training material</li> <li>- Will continue and complete demonstrations of viable radars and conduct technical reviews</li> <li>- Will continue preparation of production decision and associated documentation</li> <li>- Will begin system integration &amp; interoperability with operational Command and Control (C2) systems</li> <li>- Will initiate contractor integration testing of components &amp; subsystems</li> <li>- Will conduct Test Readiness Reviews (TRRs) prior to specific operational &amp; integration test events</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 funding increased to pursue Middle-Tier Acquisition rapid prototyping with operational assessment demonstrations and system integration of viable production-ready alternatives. The Air Force will select a capability that meets 3DELRR requirements for a production decision in FY21.</p>				
<p><b>Title:</b> Government Development, Operational &amp; Integration Test and Evaluation Planning and Execution</p> <p><b>Description:</b> Planning and execution of Government development, operational, integration test and evaluation.</p> <p><b>FY 2020 Plans:</b> Activities will include but are not limited to the following:</p> <ul style="list-style-type: none"> <li>- Continue to monitor reliability growth during contractor component, subsystem and system level testing</li> <li>- Continue 3DELRR Mobility Testing</li> <li>- Continue efforts for interoperability with external agencies as required</li> <li>- Continue development and refinement of TEMP and other test planning documentation</li> <li>- Continue to integrate Modeling and Simulation (M&amp;S) into test plans</li> <li>- Continue cybersecurity planning</li> <li>- Evaluate contractor test data: tailor lessons for Government operational and integration testing</li> <li>- Analyze all system information submitted by contractors during demonstrations</li> <li>- Conduct travel and administration of Demonstration event and analysis of results</li> </ul> <p><b>FY 2021 Plans:</b></p>		3.663	18.772	6.663

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Activities will include but are not limited to the following:</p> <ul style="list-style-type: none"> <li>- Will continue to receive and evaluate contractor test data: tailor lessons for Government operational &amp; integration testing</li> <li>- Will continue 3DELRR Mobility Testing</li> <li>- Will continue efforts for interoperability with external agencies as required</li> <li>- Will continue development and refinement of TEMP and other test planning documentation</li> <li>- Will continue to integrate Modeling and Simulation (M&amp;S) into test plans</li> <li>- Will continue cybersecurity planning</li> <li>- Will witness formal contractor test integration events</li> <li>- Will conduct Test Readiness Review (TRR) to support Government Developmental Test &amp; Evaluation (DT&amp;E)</li> <li>- Will conduct training and travel in preparation for Government operational &amp; integration testing</li> <li>- Will conduct system integration and interoperability with operational C2 systems architecture and software</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 funding decreased as Mid-Tier rapid prototyping capability demonstrations accelerated significant system evaluation planning and execution into FY20 and follow-on operational integration into FY21.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	24.716	23.190	19.356

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**

The previous 3DELRR strategy was a single-step acquisition approach for full capability to develop, produce and field a highly capable and sustainable, expeditionary long-range radar. A limited competition was conducted for the Engineering and Manufacturing Development (EMD) contract among the multiple contractors that participated in two Technology Maturation and Risk Reduction (TMRR) phases. The EMD contract was awarded 11 May 2017 to a single developer to complete the final design, build, integration and test of the 3DELRR system.

Due to chronic technical challenges rooted in current EMD contractor's proposed TPS-81 design and subsequent schedule delays, the USAF began conclusion of the current EMD contract in January 2020. The Milestone Decision Authority (MDA) directed a Middle-Tier Acquisition rapid-prototyping approach to accelerate capability delivery, pursuant to FY16 NDAA Section 804 guidance.

The current 3DELRR strategy is to implement rapid-prototyping, conduct operational assessment demonstrations of viable production-ready alternatives in FY20, and select the best solution that meets 3DELRR requirements in order to make the initial production decision in FY21. This strategy has the potential to deliver capability to the field no later than FY24.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>

Test activities planned for FY21 include but are not limited to rapid-prototyping, demonstration and tailored Developmental Integration Test.

The MDA for the 3DELRR program is the Assistant Secretary of the Air Force (Acquisition). The Air Force Program Executive Officer (PEO) for Battle Management (AFPEO BM) located at Hanscom AFB, MA is the PEO for 3DELRR. The Air Force Life Cycle Management Center (AFLCMC) located at Wright-Patterson AFB, OH is the contracting authority for the 3DELRR program. AFLCMC provides contracting, legal, comptroller, programmatic, engineering, test and logistics support.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>	<b>Project (Number/Name)</b> 646002 / <i>Three Dimensional Expeditionary Long Range Radar</i>
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Demonstration & Integration (Rapid-Prototyping)	C/TBD	Not specified. : TBD	0.000	-		2.029	Apr 2020	7.874	Nov 2020	-		7.874	0.000	9.903	-
EMD Phase (Prime Contract)	C/FPIF	Raytheon : Woburn, MA	0.000	14.053	Sep 2019	-		-		-		-	0.000	14.053	56.640
<b>Subtotal</b>			0.000	14.053		2.029		7.874		-		7.874	0.000	23.956	N/A

**Remarks**  
 FINANCIAL PERFORMANCE: 3DELRR is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, however, the 3DELLR EMD contract is a FPIF contract with progress payments. Twenty percent of incurred costs were withheld until the end of the contract, when they were liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

Due to chronic technical challenges rooted in current EMD contractor's proposed TPS-81 design and subsequent schedule delays, the USAF began conclusion of the current EMD contract after final FPIF contract progress payment in FY19.

<b>Support (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
System Engineering - A	SS/CPFF	MIT/Lincoln Laboratory : Lexington, MA	0.000	1.632	Sep 2019	1.139	Nov 2019	0.922	Nov 2020	-		0.922	0.000	3.693	-
System Engineering - C	SS/CPFF	GTRI : Atlanta, GA	0.000	0.198	Feb 2019	0.527	Feb 2020	0.555	Feb 2021	-		0.555	0.000	1.280	-
System Engineering - D	SS/CPFF	MITRE : Bedford, MA	0.000	2.318	Sep 2019	3.081	Oct 2019	3.560	Oct 2020	-		3.560	0.000	8.959	-
<b>Subtotal</b>			0.000	4.148		4.747		5.037		-		5.037	0.000	13.932	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>	<b>Project (Number/Name)</b> 646002 / <i>Three Dimensional Expeditionary Long Range Radar</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Government Developmental Test and Evaluation Planning and Preparation	PO	46 TS : Eglin AFB, FL	0.000	1.739	Jan 2019	11.772	Jan 2020	1.843	Jan 2021	-		1.843	0.000	15.354	-
<b>Subtotal</b>			0.000	1.739		11.772		1.843		-		1.843	0.000	15.354	N/A

**Remarks**  
FY21 decreased funding in Test and Evaluation reflects change in the acquisition strategy to a Middle-Tier Acquisition rapid-prototyping program with acceleration of demonstration and analysis into FY20 with follow-on operational system integration and testing in FY21.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Program Management Administration	Various	AFLCMC/HBDD : Hanscom AFB, MA	0.000	4.776	Oct 2018	4.642	Oct 2019	4.602	Oct 2020	-		4.602	0.000	14.020	-
<b>Subtotal</b>			0.000	4.776		4.642		4.602		-		4.602	0.000	14.020	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	0.000	24.716	23.190	19.356	-	19.356	0.000	67.262	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>	<b>Project (Number/Name)</b> 646002 / <i>Three Dimensional Expeditionary Long Range Radar</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Three Dimensional Expeditionary Long Range Radar</i></b>	
Operational Assessment Demonstration Planning	██████████
Prototype Other Transaction Authority Contract Award	██████████
Operational Assessment Demonstration	██████████
Command & Control Integration	██████████
Operational Test Planning	██████████
Operational / Integration Test	██████████

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>	<b>Project (Number/Name)</b> 646002 / <i>Three Dimensional Expeditionary Long Range Radar</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Three Dimensional Expeditionary Long Range Radar</i></b>				
Operational Assessment Demonstration Planning	2	2020	3	2020
Prototype Other Transaction Authority Contract Award	2	2020	3	2020
Operational Assessment Demonstration	3	2020	4	2020
Command & Control Integration	2	2021	4	2021
Operational Test Planning	1	2021	2	2021
Operational / Integration Test	4	2021	1	2022

**Note**

Schedule is restricted to the current, approved funding profile and allows for completion of rapid prototyping, test and integration efforts that will lead to a production contract decision. Planned events provide necessary data to inform FY22 budget request.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207522F / <i>Airbase Air Defense Systems (ABADS)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	8.737	0.000	8.737	26.575	19.636	14.616	14.617	Continuing	Continuing
640410: <i>Tech Maturation &amp; Risk Reduct</i>	-	0.000	0.000	8.737	0.000	8.737	26.575	19.636	14.616	14.617	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
C-sUAS development efforts were previously funded in PE 0604287F. This is not a new start effort.

**A. Mission Description and Budget Item Justification**

Airbase Air Defense Systems (ABADS)

The Air Force Counter-small Unmanned Aircraft System (C-sUAS) program will be the principal USAF program to defend against the emerging and growing small unmanned aerial system threat. This program protects strategic assets vital to national security while bedded down and while on the move. It also protects personnel deployed in theater. Small UASs are inexpensive and commercially available and have been used to target US Service members, Allies and Coalition partners. This threat will evolve continuously as commercially available drone technology and drones advance rapidly. The USAF will be analyzing the evolving threat and evaluating new capabilities to take on this threat, while also designing an architecture and new systems to bring down life cycle cost so that capability can be fielded to all 180+ AF installations and protect AF assets globally.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Airbase Air Defense System capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0207522F I Airbase Air Defense Systems (ABADS)
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	8.737	0.000	8.737
Total Adjustments	0.000	0.000	8.737	0.000	8.737
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	8.737	0.000	8.737

**Change Summary Explanation**

Effort realigned from PE 0604287F in the FY2021 budget.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Airbase Air Defense Systems (ABADS)	0.000	0.000	8.737	0.000	8.737
<b>Description:</b> Airbase Air Defense Systems (ABADS) The Air Force Counter-small Unmanned Aircraft System (C-sUAS) will continue to defend against the emerging and growing small unmanned aerial system threat. This program protects strategic assets vital to national security while bedded down and while on the move. This program will continue to adapt quickly to keep pace with commercially available drone technology and advancements in emerging threats.					
<b>FY 2020 Plans:</b> N/A					
<b>FY 2021 Base Plans:</b> - Will develop Command, Control, Communication, Computers, and Intelligence (C4I), to include but not limited to artificial intelligence development for operator task automation, closed-loop training system for operator certification and proficiency, track fusion updates, Link 16 capability integration, BDOC of the future development, standardize application data models, design physical on-premise network for cloud implementation. - Will develop Electronic Warfare upgrades, to include but not limited to new Ninja skills from new external agencies, and leverage full Ninja capability within Medusa C2.					

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207522F / <i>Airbase Air Defense Systems (ABADS)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Will develop Urgent Need System Upgrades, to include but not limited to false alarm reduction, increase line of bearing accuracy and finalize integration of all components. - Will have PMO Support to include but not limited to, modeling and simulation capability, test range support, system integration labs and contractor support.  <b>FY 2021 OCO Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Effort realigned from PE 0604287F in the FY2021 budget.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	8.737	0.000	8.737

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 0207522F: <i>Airbase Air Defense Systems (ABADS)</i>	0.000	0.000	51.512	-	51.512	27.485	25.578	11.792	11.642	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**  
 Implement a "Government-as-the-Integrator" approach by procuring integration services independent of systems being developed through existing integration service contracts within the DoD. The services will establish processes and support tools to enable integration of planned projects. Example integration services include, but are not limited to, establishing a continuous integration/continuous deployment (CI/CD) software pipeline, implementing Agile DevSecOps processes and deploying model-based design. Leverage small business innovative research opportunities to generate new code to produce capabilities for detection and defeat new sUAS platforms. Leverage urgent need support contracts to develop innovative and incremental changes to systems fielded for C-sUAS urgent needs. Accomplish system verification-fix-verification loops earlier in the lifecycle for planned projects by leveraging independent integration services from systems being developed. Integration services will be acquired from existing integration service contracts within the DoD.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207522F / Airbase Air Defense Systems (ABADS)	<b>Project (Number/Name)</b> 640410 / Tech Maturation & Risk Reduct
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Software Development	Various	Not specified. : TBD	-	0.000		0.000		7.000	Jan 2021	0.000		7.000	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		0.000		7.000		0.000		7.000	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test	Various	Not specified. : TBD	-	0.000		0.000		1.737	Jan 2021	0.000		1.737	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		0.000		1.737		0.000		1.737	Continuing	Continuing	N/A

			Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	0.000		0.000		8.737		0.000		8.737	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207522F / Airbase Air Defense Systems (ABADS)	<b>Project (Number/Name)</b> 640410 / Tech Maturation & Risk Reduct

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>FY21 Events</b>																												
Software Development																												
Test																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0207522F / Airbase Air Defense Systems (ABADS)	<b>Project (Number/Name)</b> 640410 / Tech Maturation & Risk Reduct

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>FY21 Events</b>				
Software Development	1	2021	4	2022
Test	1	2021	4	2022

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	28.327	10.000	5.990	0.000	5.990	0.000	0.000	0.000	0.000	0.000	44.317
646504: <i>AF Prototyping</i>	-	18.747	5.000	2.995	0.000	2.995	0.000	0.000	0.000	0.000	0.000	26.742
646505: <i>USCYBERCOM Prototyping</i>	-	9.580	5.000	2.995	0.000	2.995	0.000	0.000	0.000	0.000	0.000	17.575

**Note**

In FY 2021, Project 646504, AF Prototyping completed.

In FY 2021, Project 646505, USCYBERCOM Prototyping completed.

**A. Mission Description and Budget Item Justification**

Unified Platform provides the Cyber Mission Forces, U.S. Cyber Command (USCYBERCOM), AF Major Commands (MAJCOM), and Service cyber components a Joint cyber operations infrastructure enabling full spectrum cyberspace operations at the operational through tactical levels of warfare. The DoD, AF, and the Cyber Mission Force require an interconnected and interoperable cyber infrastructure to conduct integrated planning and execution of cyberspace operations. Unified Platform delivers this capability through the integration of disparate, Service-specific platforms and systems, infrastructure, mission capabilities, data analytics, and programs to build interoperable and scalable network for cyber capabilities. A common, Unified Platform allows the DoD to achieve and maintain decision and operational superiority, the key to successful cyber operations within the highly dynamic cyberspace domain.

Unified Platform rapid prototyping efforts integrate Service-specific cyber capabilities and explore novel cyber technologies culminating in an initial Unified Platform capability (e.g. minimum viable product). The rapidly evolving cyberspace domain requires flexibility in which rapid prototyping activities inform the initial Unified Platform capability baseline through the early stages of technology maturation and delivery. Rapid prototyping efforts are executed in an operational development environment to expedite development and evaluation of cyber capabilities within relevant warfighter timelines and are transitioned to Foundational Efforts (BA 7, PE 0208099F Unified Platform, 672281 Foundational Efforts) once included in the Unified Platform baseline.

The Secretary of the Air Force leads the Unified Platform effort as Executive Agent on behalf of the Department of Defense. Unified Platform directly supports the Joint Network Attack Initial Capabilities Document (ICD), the National Military Strategy for Cyberspace Operations (NMS-CO), USCYBERCOM operational directives, the latest MAJCOM Offensive Cyberspace Operations System Flight Plan, and other formal requirements documents.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Unified Platform weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	29.800	10.000	6.000	0.000	6.000
Current President's Budget	28.327	10.000	5.990	0.000	5.990
Total Adjustments	-1.473	0.000	-0.010	0.000	-0.010
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-1.473	0.000	-0.010	0.000	-0.010



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>				<b>Project (Number/Name)</b> 646504 / <i>AF Prototyping</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
646504: <i>AF Prototyping</i>	-	18.747	5.000	2.995	0.000	2.995	0.000	0.000	0.000	0.000	0.000	26.742
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The rapidly evolving cyberspace domain demands highly flexible requirements, acquisition activities, and operations to respond to emerging opportunities or mitigate adversary actions. Salient to this mission area, rapid prototyping activities provide the structure to rapidly develop, evaluate, and integrate new cyber capabilities and inform the initial Unified Platform capability baseline during the early stages of technology maturation and delivery. Air Force Prototyping efforts support this need through rapid and exploratory research, prototype development, risk reduction, testing, and integration of cyber capabilities contributing to early operational development of the Unified Platform capability baseline. The USAF in conjunction with the Services and National Agencies execute operationally focused research and development and rapid prototyping to explore and determine validity of potential infrastructure, architectures, and capabilities/tools to support Cyber Mission Forces. These rapid prototyping efforts will be tailored for near-immediate integration into the Unified Platform baseline (BA 7, PE 0208099F Unified Platform, BPAC 672281 Foundational Efforts) for delivery to cyber warfighters.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Unified Platform weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> AF Prototyping	18.747	5.000	2.995
<b>Description:</b> AF prototyping efforts will initially develop the UP Minimum Viable Product (MVP) baseline from existing "best of breed" systems, completed prototyping efforts, existing Service-developed solutions, joint user-input, and other sources			
<b>FY 2020 Plans:</b>			
- Continue to develop incremental operational capability addressing highest priority user requirements.			
- Some aspects of the effort are classified and will be provided on a need-to-know basis.			
<b>FY 2021 Plans:</b>			
- Will continue to develop incremental operational capability addressing highest priority user requirements.			
- Some aspects of the effort are classified and will be provided on a need-to-know basis.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>	<b>Project (Number/Name)</b> 646504 / <i>AF Prototyping</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Funding decreased due to integration of AF prototyping efforts into Unified Platform baseline and reduction of rapid prototyping activity.			
<b>Accomplishments/Planned Programs Subtotals</b>	18.747	5.000	2.995

**C. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 07 0208099F: <i>Unified Platform (UP)</i>	26.093	84.702	84.645	-	84.645	106.550	106.524	117.206	119.509	Continuing	Continuing
• OPAF 03 835080: <i>AFNET</i>	-	4.963	-	-	-	-	-	-	-	Continuing	Continuing
• OPAF 03 834320: <i>C3 Countermeasures</i>	-	-	4.956	-	4.956	4.957	4.954	5.043	5.136	Continuing	Continuing

**Remarks**

Beginning in FY21 associated OPAF realigned from AFNET WSC to C3 Countermeasures WSC for clarity in reporting.

**D. Acquisition Strategy**

Unified Platform represents a flexible, interoperable, and scalable warfighter capability to be employed by the Army, Navy, Marine Corps, and Air Force in conjunction with U.S. Cyber Command (USCYBERCOM). In order to match the speed of need of the highly dynamic cyberspace domain, the Service-agnostic Unified Platform capability implements an agile development framework to facilitate the rapid development, integration, and fielding of capabilities to remain responsive to evolving warfighter requirements. The Unified Platform program executes the agile development requirements provided by the Army, Navy, Marine Corps, Air Force, and USCYBERCOM stakeholders in accordance with the prioritization provided by the multi-Service Unified Platform governance structure.

The initial Unified Platform capability will deliver a minimum viable product (MVP) for immediate deployment and operational use by the Cyber Mission Force. Subsequent build iterations will continue to deliver enhanced capabilities, incrementally building the Unified Platform capability to match warfighter needs and requirements to achieve cyberspace dominance. Early development of the Unified Platform baseline capability relies on extensive rapid prototyping efforts to analyze integration constraints and opportunities of Service-specific cyber capabilities to realize the Unified Platform MVP and inform the future Unified Platform baseline (BA 4, PE 0208099F Unified Platform, 646504 AF Prototyping and 646505 USCYBERCOM Prototyping). In parallel, an enduring foundational Unified Platform thrust area supports the development and maturation of Unified Platform baseline, integrates successful prototyping activities, and implements an agile development/security/operations (DevSecOps) construct to rapidly evolve and enhance the Unified Platform capability to match warfighter requirements (BA 7, PE 0208099F Unified Platform, 672281 Foundational Efforts).

The Unified Platform program office utilizes Concept, Development, Risk management, Production, or Deployment Plans as part of a streamlined approach to agile acquisition planning. All plans contain sufficient information to inform acquisition decisions (i.e., authorities to proceed), within the agile framework, to determine readiness to enter into the applicable phase of the acquisition process. Unified Platform will utilize both new and existing contractual vehicles, such as Government-

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>	<b>Project (Number/Name)</b>
3600 / 4	PE 0208099F / <i>Unified Platform (UP)</i>	646504 / <i>AF Prototyping</i>

Wide Acquisition Contract (GWAC) vehicles (Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV (SEWP IV), and General Services Administration (GSA) Federal Supply Schedules and a new Cyber Indefinite Delivery Indefinite Quantity (IDIQ) contract. The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that can meet many requirements related to Unified Platform. These multiple-award contractual vehicles have already met the statutory requirements of the Competition in Contracting Act (CICA); they require a fair opportunity to all contract holders, in accordance with Federal Acquisition Regulation (FAR) 16.505, unless an exception to fair opportunity applies.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / Unified Platform (UP)	<b>Project (Number/Name)</b> 646504 / AF Prototyping
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Agile Capability Prototyping	Various	Various : Various	-	17.947	Oct 2018	5.000	Oct 2019	2.995	Oct 2020	-		2.995	0.000	25.942	4.700
<b>Subtotal</b>			-	17.947		5.000		2.995		-		2.995	0.000	25.942	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Systems Engineering	Various	Various : Various	-	0.600	Dec 2018	-		-		-		-	0.000	0.600	-
Acquisition Support	Various	Various : Various	-	0.200	Dec 2018	-		-		-		-	0.000	0.200	-
<b>Subtotal</b>			-	0.800		-		-		-		-	0.000	0.800	N/A

<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	18.747	5.000	2.995	-	2.995	0.000	26.742	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>	<b>Project (Number/Name)</b> 646504 / <i>AF Prototyping</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>AF Prototyping</i></b>	
Agile Capability Prototyping	[REDACTED]

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>	<b>Project (Number/Name)</b> 646504 / <i>AF Prototyping</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>AF Prototyping</i></b>				
Agile Capability Prototyping	1	2019	4	2021

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>	<b>Project (Number/Name)</b> 646505 / <i>USCYBERCOM Prototyping</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
646505: <i>USCYBERCOM Prototyping</i>	-	9.580	5.000	2.995	0.000	2.995	0.000	0.000	0.000	0.000	0.000	17.575
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY 2021, Project 646504, AF Prototyping completed.

In FY 2021, Project 646505, USCYBERCOM Prototyping completed.

**A. Mission Description and Budget Item Justification**

U.S. Cyber Command's (USCYBERCOM) mission is to deter or defeat strategic cyber threats to US interests and infrastructure, provide mission assurance for the operations and defense of the Department of Defense information environment, and support the achievement of Combatant Commander and Joint Force Commander Objectives.

The rapidly evolving cyberspace domain demands highly flexible requirements, acquisition activities, and operations to respond to emerging opportunities or mitigate adversary actions. Salient to this mission area, rapid prototyping activities provide the structure to rapidly develop, evaluate, and integrate new cyber capabilities and inform the initial Unified Platform capability baseline during the early stages of technology maturation and delivery. USCYBERCOM Prototyping efforts support this need through the focus on the rapid and exploratory research, prototype development, risk reduction, testing, and integration of cyber capabilities contributing to early operational development of the Unified Platform capability baseline. USCYBERCOM in conjunction with the Services and National Agencies execute operationally focused research and development and rapid prototyping to explore and determine validity of potential infrastructure, architectures, and capabilities/tools to support Cyber Mission Forces. These rapid prototyping efforts will be tailored for near-immediate integration into the Unified Platform baseline (BA 7, PE 0208099F Unified Platform, BPAC 672281F Foundational Efforts) for delivery to cyber warfighters.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Unified Platform weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> USCYBERCOM Prototyping	9.580	5.000	2.995
<b>Description:</b> Funding supports USCYBERCOM prototyping efforts associated with the research, development, and integration of cyber technologies supporting the Unified Platform program.			
<b>FY 2020 Plans:</b> - Continue to conduct prototyping efforts in support of Unified Platform program.			

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>	<b>Project (Number/Name)</b> 646505 / <i>USCYBERCOM Prototyping</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
- The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis.			
<b><i>FY 2021 Plans:</i></b>			
- Will continue to conduct prototyping efforts in support of Unified Platform program.			
- The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b>			
Funding decreased due to integration of AF prototyping efforts into Unified Platform and reduction of rapid prototyping activity.			
<b>Accomplishments/Planned Programs Subtotals</b>	9.580	5.000	2.995

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 07 0208099F: <i>Unified Platform (UP)</i>	26.559	84.702	84.645	-	84.645	106.550	106.524	117.206	119.509	Continuing	Continuing
• OPAF 03 835080: <i>AFNET</i>	-	4.963	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• OPAF 03 834320: <i>C3 Countermeasures</i>	-	0.000	4.956	-	4.956	4.957	4.954	5.043	5.136	Continuing	Continuing

**Remarks**  
Beginning in FY21 associated OPAF realigned from AFNET WSC to C3 Countermeasures WSC for clarity in reporting.

**D. Acquisition Strategy**  
Unified Platform represents a flexible, interoperable, and scalable warfighter capability to be employed by the Army, Navy, Marine Corps, and Air Force in conjunction with U.S. Cyber Command (USCYBERCOM). In order to match the speed of need of the highly dynamic cyberspace domain, the Service-agnostic Unified Platform capability implements a scaled agile development framework (SAFe) to facilitate the rapid development, integration, and fielding of capabilities to remain responsive to evolving warfighter requirements. The Unified Platform program executes the agile development requirements provided by the Army, Navy, Marine Corps, Air Force, and USCYBERCOM stakeholders in accordance with the prioritization provided by the multi-Service Unified Platform governance structure.

The initial Unified Platform capability will deliver a minimum viable product (MVP) for immediate deployment and operational use by the Cyber Mission Force. Subsequent build iterations will continue to deliver enhanced capabilities, incrementally building the Unified Platform capability to match warfighter needs and requirements to achieve cyberspace dominance. Early development of the Unified Platform baseline capability relies on extensive rapid prototyping efforts to analyze integration constraints and opportunities of Service-specific cyber capabilities to realize the Unified Platform MVP and inform the future Unified Platform baseline (BA 4, PE 0208099F Unified Platform, 646504 AF Prototyping and 646505 USCYBERCOM Prototyping). In parallel, an enduring foundational Unified Platform thrust area supports the development and maturation of Unified Platform baseline, integrates successful prototyping activities, and implements an agile development/security/



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>	<b>Project (Number/Name)</b>
3600 / 4	PE 0208099F / <i>Unified Platform (UP)</i>	646505 / <i>USCYBERCOM Prototyping</i>

operations (DevSecOps) construct to rapidly evolve and enhance the Unified Platform capability to match warfighter requirements (BA 7, PE 0208099F Unified Platform, 672281 Foundational Efforts).

The Unified Platform program office utilizes Concept, Development, Risk management, Production, or Deployment Plans as part of a streamlined approach to agile acquisition planning. All plans contain sufficient information to inform acquisition decisions (i.e., authorities to proceed), within the agile framework, to determine readiness to enter into the applicable phase of the acquisition process. Unified Platform will utilize both new and existing contractual vehicles, such as Government-Wide Acquisition Contract (GWAC) vehicles (Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV (SEWP IV), and General Services Administration (GSA) Federal Supply Schedules and a new Cyber Indefinite Delivery Indefinite Quantity (IDIQ) contract. The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that can meet many requirements related to Unified Platform. These multiple-award contractual vehicles have already met the statutory requirements of the Competition in Contracting Act (CICA); they require a fair opportunity to all contract holders, in accordance with Federal Acquisition Regulation (FAR) 16.505, unless an exception to fair opportunity applies.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>	<b>Project (Number/Name)</b> 646505 / <i>USCYBERCOM Prototyping</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Agile Capability Prototyping	Various	Multiple Agencies : Various	-	9.180	Oct 2018	4.600	Oct 2019	2.995	Oct 2020	-		2.995	0.000	16.775	4.600
<b>Subtotal</b>			-	9.180		4.600		2.995		-		2.995	0.000	16.775	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Systems Engineering	Various	Various : Various	-	0.300	Dec 2018	0.300	Dec 2019	-		-		-	0.000	0.600	0.300
Acquisition Support	Various	Various : Various	-	0.100	Dec 2018	0.100	Dec 2019	-		-		-	0.000	0.200	0.100
<b>Subtotal</b>			-	0.400		0.400		-		-		-	0.000	0.800	N/A

<b>Project Cost Totals</b>			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	9.580	5.000	2.995	-	2.995	0.000	17.575	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>	<b>Project (Number/Name)</b> 646505 / <i>USCYBERCOM Prototyping</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>USCYBERCOM Prototyping</i></b>	
Agile Capability Prototyping	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0208099F / <i>Unified Platform (UP)</i>	<b>Project (Number/Name)</b> 646505 / <i>USCYBERCOM Prototyping</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>USCYBERCOM Prototyping</i></b>				
Agile Capability Prototyping	1	2019	4	2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	41.880	36.910	39.293	0.000	39.293	46.885	45.167	31.800	32.386	Continuing	Continuing
641334: <i>Common Data Link (CDL)</i>	-	41.880	36.910	39.293	0.000	39.293	46.885	45.167	31.800	32.386	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Common Data Link Executive Agent (CDL EA) provides the DoD standard for interoperable, multi-service, multi-agency, Intelligence, Surveillance, and Reconnaissance (ISR) datalinks for 11,500+ DoD manned/unmanned airborne and ground platforms. As the DoD CDL EA, the Air Force is responsible for cross-service application of CDL RDT&E Military Intelligence Program (MIP) funds facilitating compliance to DoD mandates. The CDL EA develops, modifies, distributes, and maintains specifications for the CDL waveform family; ensuring design configuration control, commonality, and interoperability among ISR platforms. Additionally, funds support managing resources allocated for development, maturation, and migration of CDL technologies.

CDL EA enables compliance with OSD mandates to effectively utilize spectrum, use approved cryptographic equipment, and provide direct support to current operations. CDL is a vital link in DoD's existing and emerging communication architectures, providing flexibility to accommodate Command and Control (C2) data and myriad types of Signals Intelligence (SIGINT), Geospatial Intelligence (GEOINT), and Full-Motion Video (FMV) data. The CDL specifications permit current and future ISR asset operations worldwide by providing sensor data directly via point-to-point and broadcast to ground sites, airborne platforms and dismounted users. Also, CDL provides the capability to relay data via air-to-air or compatible satellite links when the asset and ground site are not in line-of-sight.

CDL EA's research and development activities support a broad array of tactical (including tactical data links (TDL) and high capacity backbone (HCB)), operational, and strategic ISR users and include achieving higher data rates, open architecture development, multi-access and multi-node network management, cryptographic modernization, advancements needed to operate in contested environments, terminal and antenna design enhancements, operations in other spectral bands, and improving spectrum efficiency. Further, CDL development improves large area surveillance missions while supporting continuous improvements and implementation of line-of-sight platform and CDL terminal Command and Control (C2), plus increased ISR (C2ISR) capabilities. Activities also include studies and analysis to support current and future requirements documentation, program planning and execution. CDL prototype terminal designs provide for future technology insertion and reduce non-recurring engineering and life-cycle costs to the user.

In addition, the Cryptographic Core Modernization (CCM) thrust enables CDL to develop a miniaturized gigabit rate Communications Security (COMSEC) device capable of managing CDL data. The miniaturized COMSEC device will allow faster throughput while reducing Size, Weight, and Power (SWaP) requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Common Data Link weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	41.880	36.910	43.537	0.000	43.537
Current President's Budget	41.880	36.910	39.293	0.000	39.293
Total Adjustments	0.000	0.000	-4.244	0.000	-4.244
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-4.244	0.000	-4.244

**Change Summary Explanation**

The FY2021 funding request was reduced by \$4.244M to account for the availability of prior year execution balances.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Common Data Link (CDL) Technology Advancement	10.165	16.010	11.375
<b>Description:</b> CDL evolutionary concept development, exploratory prototyping, advanced technology demonstrations, and studies of emerging technologies and capability gaps.			
<b>FY 2020 Plans:</b>			
- Continue research and development of new LPI/LPD/AJ waveform capability to support operations in the contested airspace.			
- Continue to research and evaluate technology developments for enhancing the CDL enterprise networking architecture, to include network management devices, applications and advanced algorithms.			
- Continue to research, evaluate and develop more spectrally efficient waveforms to support Combatant Command demand for higher bandwidth transmission and improved jam resistant capabilities.			
- Continue to research, evaluate and develop improvements to CDL waveforms to lower probability of detection and interception to support Combatant Command demand for improved covertness of ground and airborne forces.			
- Continue development of enhanced, CDL-based Intelligence, Surveillance and Reconnaissance (ISR) communication capabilities across multiple platforms and echelons among U.S and allied partners.			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>- Continue development of a collaborative CDL modeling and simulation environment using Navy Research Lab's Extendable Mobile Ad-Hoc Network Emulator (EMANE) framework for CDL performance analysis and waveform advancements. The CDL EMANE environment will be the baseline for joint Service and vendor collaboration as the community modernizes CDL for the future fight.</li> <li>- Continue waveform analysis of current CDL capabilities and future enhancements on their ability to achieve mission success in National Defense Strategy (NDS) derived scenarios to focus future CDL modernization efforts to update the CDL specifications.</li> <li>- Commence evaluation, analysis and study of multi-beam antenna technology to further improve CDL networking and Low Probability of Interception / Low Probability of Detection / Anti-Jam (LPI/LPD/AJ) capabilities.</li> <li>- Continue to research, evaluate and develop an Open Systems Architecture to improve CDL enterprise interoperability and terminal design flexibility.</li> <li>- Commence exploratory prototyping efforts and advanced technology demonstrations in support of emerging communication backbone architecture development across air, space and terrestrial layers, to include agile high capacity data transport, assured communications and multi-mode access network.</li> <li>- Commence research and develop upgrades to support improved CDL operations by delivering a flexible profile and configuration management capability that delivers flexible waveform modes to support high data rates, antenna configuration, network management, fast network reconfiguration, and improve jam resistant capabilities.</li> <li>- Commence research and evaluate developing Artificial Intelligence (AI) technologies to support faster correlation and fusion of ISR and CDL network management processes.</li> <li>- Continue to research and evaluate developing technologies to minimize the National Security Agency (NSA) required certification requirements for terminals while standardizing Communications Security (COMSEC) implementation.</li> </ul> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will continue development and maturation of new LPI/LPD/AJ waveform capability to support operations in the contested airspace.</li> <li>- Will continue to research and evaluate technology developments for enhancing the CDL enterprise networking architecture, to include network management devices, applications and advanced algorithms</li> <li>- Will continue to research, evaluate and develop more spectrally efficient waveforms to support Combatant Command demand for higher bandwidth transmission and improved jam resistant capabilities</li> <li>- Will continue to research, evaluate and develop improvements to CDL waveforms to lower probability of detection and interception to support Combatant Command demand for improved covertness of ground and airborne forces.</li> <li>- Will continue development of enhanced, CDL-based Intelligence, Surveillance and Reconnaissance (ISR) communication capabilities across multiple platforms and echelons among U.S and allied partners.</li> <li>- Will continue development of a collaborative CDL modeling and simulation environment using Navy Research Lab's Extendable Mobile Ad-Hoc Network Emulator (EMANE) framework for CDL performance analysis and waveform advancements. The CDL</li> </ul>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>EMANE environment will be the baseline for joint Service and vendor collaboration as the community modernizes CDL for the future fight.</p> <ul style="list-style-type: none"> <li>- Will continue waveform analysis of current CDL capabilities and future enhancements on their ability to achieve mission success in National Defense Strategy (NDS) derived scenarios to focus future CDL modernization efforts to update the CDL specifications.</li> <li>- Will commence evaluation, analysis and study of multi-beam antenna technology to further improve CDL networking and Low Probability of Interception / Low Probability of Detection / Anti-Jam (LPI/LPD/AJ) capabilities.</li> <li>- Will continue to research, evaluate and develop an Open Systems Architecture to improve CDL enterprise interoperability and terminal design flexibility.</li> <li>- Will commence exploratory prototyping efforts and advanced technology demonstrations in support of emerging communication backbone architecture, including HCB development, across air, space and terrestrial layers, to include agile high capacity data transport, assured communications and multi-mode access network.</li> <li>- Will commence research and develop upgrades to support improved CDL operations by delivering a flexible profile and configuration management capability that delivers flexible waveform modes to support high data rates, antenna configuration, network management, fast network reconfiguration, and improve jam resistant capabilities.</li> <li>- Will commence research and evaluate developing Artificial Intelligence (AI) technologies to support faster correlation and fusion of ISR and CDL network management processes.</li> <li>- Will continue to research and evaluate developing technologies to minimize the National Security Agency (NSA) required certification requirements for terminals while standardizing Communications Security (COMSEC) implementation.</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The overall decrease in spending for the Technology Advancement activity between 2020 and 2021 is due to the CDL cycle of producing the system Specifications during the odd years (e.g. 2021), which cyclically calls for a decrease in spending efforts for Technology Advancement and inversely increasing spending efforts for Specification Development activities during 2021. Conversely, during the even years (e.g. 2020) Technology Advancement receives a higher spending effort while inversely lowering specification efforts for Specification Development.</p>				
<p><b>Title:</b> Common Data Link (CDL) Specification Development, Validation, Test and Maintenance</p> <p><b>Description:</b> Systems engineering lifecycle for CDL and NATO STANAG 7085 specification development: requirement decomposition, specification development (modeling, maturation, documentation), specification validation (and associated component prototyping), testing, configuration management, and process maintenance.</p> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- Continue development and maturation of new LPI/LPD/AJ waveform capability to support operations in the contested airspace.</li> </ul>		24.715	13.800	20.318



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>- Continue development of vendor and government owner reference implementation of the new LPI/LPD/AJ waveform to performance future validation to ensure the CDL specification is accurate and can be built by multiple vendors in the future, therefore keeping the market space open.</li> <li>- Continue evaluation, analysis and study of network management devices, network and waveform configuration tool development; transition improved technologies into CDL Specification baseline that increases data sharing across Service-specific networks.</li> <li>- Continue validation of Bandwidth Efficient CDL's (BE-CDL) new Direct Sequence Spread Spectrum (DSSS) capability that improves CDL data transmissions rates at lower power levels.</li> <li>- Continue development and advancement of dynamical control algorithms to enable terminals to more efficiently use CDL spectrum. This work will also continue to validate the CDL Common Control Interface.</li> <li>- Continue to work with CDL industry partners and DoD Services and Agencies to document, validate and implement common terminal control interfaces through use of commercially recognized standards.</li> <li>- Continue configuration control of the CDL architecture, standards, specifications and reference artifacts to support open interoperability and open competition.</li> <li>- Continue development of CDL test equipment capable of compliance testing to the latest, validated version of CDL specifications.</li> </ul> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will continue development and maturation of new LPI/LPD/AJ waveform capability to support operations in the contested airspace.</li> <li>- Will continue development of vendor and government owner reference implementation of the new LPI/LPD/AJ waveform to performance future validation to ensure the CDL specification is accurate and can be built by multiple vendors in the future, therefore keeping the market space open.</li> <li>- Will continue evaluation, analysis and study of network management devices, network and waveform configuration tool development; transition improved technologies into CDL Specification baseline that increases data sharing across Service-specific networks.</li> <li>- Will continue validation of Bandwidth Efficient CDL's (BE-CDL) new Direct Sequence Spread Spectrum (DSSS) capability that improves CDL data transmissions rates at lower power levels.</li> <li>- Will continue development and advancement of dynamical control algorithms to enable terminals to more efficiently use CDL spectrum. This work will also Will continue to validate the CDL Common Control Interface.</li> <li>- Will continue to work with CDL industry partners and DoD Services and Agencies to document, validate and implement common terminal control interfaces through use of commercially recognized standards.</li> <li>- Will continue configuration control of the CDL architecture, standards, specifications and reference artifacts to support open interoperability and open competition.</li> </ul>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>- Will continue development of CDL test equipment capable of compliance testing to the latest, validated version of CDL specifications.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The overall decrease in spending for the Technology Advancement activity between 2020 and 2021 is due to the CDL cycle of producing the system Specifications during the odd years (e.g. 2021), which cyclically calls for a decrease in spending efforts for Technology Advancement and inversely increasing spending efforts for Specification Development activities during 2021. Conversely, during the even years (e.g. 2020) Technology Advancement receives a higher spending effort while inversely lowering specification efforts for Specification Development.</p>			
<p><b>Title:</b> Common Data Link (CDL) Cryptographic Modernization</p> <p><b>Description:</b> Phased development effort to modernize CDL Communications Security (COMSEC) devices and standards to maximize performance and reduce SWaP requirements while supporting interoperability, commonality, modularity, portability, remote management, multi-level security and releasability.</p> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- Continue to research and evaluate developing technologies to minimize the National Security Agency (NSA) required certification requirements for terminals while standardizing Communications Security (COMSEC) implementation.</li> <li>- Continue software and firmware upgrades for generation two (Gen 2) Nano and Mini cryptographic core modernization (CCM) modules for US and NATO release.</li> <li>- Submit Engineering Change Proposals (ECP) for Nano and Mini CCM Security Validation Testing (SVT) and subsequent National Security Agency (NSA) information assurance (IA) certification.</li> <li>- Continue to ensure CDL family of waveforms meet developing transportation security (TRANSEC) requirements as outlined by the Office of Secretary of Defense Chief Information Officer (DoD CIO).</li> <li>- Continue development of multi-channel, gigabit data rate (Mega) cryptographic cores with Gen 2 advances.</li> <li>- Continue development and design of common End Cryptographic Units (ECUs) for use with medium- and large-sized ISR terminals.</li> <li>-Commence development of a reference ECU using the Mega CCM crypto core for hardware/software and interface documentation validation.</li> <li>- Continue advancement of standardized CCM interface specifications for modularity to ease future systems upgrades, facilitate competitive terminal procurements, promote innovation, and maintain backward compatibility with existing Intelligence, Surveillance and Reconnaissance (ISR) systems.</li> <li>- Continue development, advancement and instantiation of CCM algorithms to support FIVE EYE (FVEY), North Atlantic Treaty Organization (NATO), and Coalition operations for secure encrypted and interoperable ISR data exchange among allied and partner nations.</li> </ul>	7.000	7.100	7.600

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>- Continue participating in FVEY, NATO and Coalition forums, testing venues and exercises (including live-fly) to ensure secure encrypted and interoperable ISR data exchange among allied and partner nations.</p> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will continue to research and evaluate developing technologies to minimize the National Security Agency (NSA) required certification requirements for terminals while standardizing Communications Security (COMSEC) implementation.</li> <li>- Will continue software and firmware upgrades for generation two (Gen 2) Nano and Mini cryptographic core modernization (CCM) modules for US and NATO release.</li> <li>- Will continue preparing Engineering Change Proposals (ECP) for Nano and Mini CCM Security Validation Testing (SVT) and subsequent National Security Agency (NSA) information assurance (IA) certification.</li> <li>- Will continue to ensure CDL family of waveforms meet developing transportation security (TRANSEC) requirements as outlined by the Office of Secretary of Defense Chief Information Officer (DoD CIO).</li> <li>- Will continue development of multi-channel, gigabit data rate (Mega) cryptographic cores with Gen 2 advances.</li> <li>- Will continue development and design of common End Cryptographic Units (ECUs) for use with medium- and large-sized ISR terminals.</li> <li>-Will Continue development of a reference ECU using the Mega CCM crypto core for hardware/software and interface documentation validation.</li> <li>- Will continue advancement of standardized CCM interface specifications for modularity to ease future systems upgrades, facilitate competitive terminal procurements, promote innovation, and maintain backward compatibility with existing Intelligence, Surveillance and Reconnaissance (ISR) systems.</li> <li>- Will continue development, advancement and instantiation of CCM algorithms to support FIVE EYE (FVEY), North Atlantic Treaty Organization (NATO), and Coalition operations for secure encrypted and interoperable ISR data exchange among allied and partner nations.</li> <li>- Will continue participating in FVEY, NATO and Coalition forums, testing venues and exercises (including live-fly) to ensure secure encrypted and interoperable ISR data exchange among allied and partner nations.</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The overall increase between 2020 and 2021 is minimal and inflationary; spending is nearly constant for this activity every year.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	41.880	36.910	39.293

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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**E. Acquisition Strategy**

The Air Force serves as the DoD Common Data Link Executive Agent, with support from each Service's designated CDL lead and the Airborne Network Division (AFLCMC/HNA). The CDL EA develops interoperable ISR data links mandated for use by DoD CIO policy. Once CDL technology development matures and a specification is published, services are responsible for CDL compliant platform and terminal procurement; National Security Agency (NSA) and Joint Interoperability Test Command (JITC) ensure compliance certifications; integration; and installation. Acquisition strategy varies by contract. Whenever possible, contracts are awarded under full and open competition.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>	<b>Project (Number/Name)</b> 641334 / <i>Common Data Link (CDL)</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Cryptographic Modernization	MIPR	NSA : Ft Meade, MD	-	7.154	Dec 2018	7.100	Jan 2020	7.600	Jun 2021	-		7.600	Continuing	Continuing	-
Generic ECU	C/Various	MIT/LL : TBD	-	4.400	Jan 2019	1.250	Dec 2019	1.300	Dec 2020	-		1.300	Continuing	Continuing	-
CDL Network Modernization	MIPR	Air Force : Various	-	2.352	Nov 2018	3.800	Jan 2020	3.905	Oct 2020	-		3.905	Continuing	Continuing	-
Fielded Terminals Database	C/CPFF	Booze Allen : McClean, VA	-	0.700	Jan 2019	0.700	Jan 2020	0.750	Feb 2021	-		0.750	Continuing	Continuing	-
Compliance Test Tool	C/Various	Various : Various	-	1.976	Feb 2019	1.525	Apr 2020	2.600	Nov 2020	-		2.600	Continuing	Continuing	-
A2AD Waveform Advancement	C/CPAF	Army : Various	-	7.650	May 2019	3.800	Apr 2020	4.100	Apr 2021	-		4.100	Continuing	Continuing	-
CDL Multi Beam Survey and Demonstration	C/Various	Navy : Various	-	1.500	Feb 2019	1.200	Dec 2019	1.275	Jun 2021	-		1.275	Continuing	Continuing	-
BE-CDL SDR	C/Various	AFRL : Various	-	0.895	Feb 2019	0.200	Dec 2019	0.225	Oct 2020	-		0.225	Continuing	Continuing	-
CDL Resource Management and Bridging Network	C/CPAF	Navy : Various	-	0.000		1.100	Dec 2019	1.100	Oct 2020	-		1.100	Continuing	Continuing	-
CDL Performance Analysis	SS/FP	JHU/APL : Various	-	0.000		0.400	Dec 2019	1.000	Oct 2020	-		1.000	Continuing	Continuing	-
CDL Life Cycle Cost Analysis	C/CPAF	Various : Various	-	-		0.250	Dec 2019	0.250	Dec 2020	-		0.250	Continuing	Continuing	-
<b>Subtotal</b>			-	26.627		21.325		24.105		-		24.105	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Service Tech Support & Spec Development	MIPR	Various : Various	-	5.148	Dec 2018	4.535	Dec 2019	4.266	Dec 2020	-		4.266	Continuing	Continuing	-
Joint Staff CDL Requirements Support	MIPR	Joint Staff - J6 : Arlington, VA	-	0.225	Oct 2019	0.225	Oct 2019	0.225	Oct 2020	-		0.225	Continuing	Continuing	-
NATO STANAG 7085 Support	MIPR	Air Force : Various	-	0.225	Oct 2019	0.225	Oct 2019	0.225	Oct 2020	-		0.225	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>	<b>Project (Number/Name)</b> 641334 / <i>Common Data Link (CDL)</i>
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
<b>Subtotal</b>			-	5.598		4.985		4.716		-		4.716	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Joint Interoperability Test Command Support	Various	Not specified. : TBD	-	0.810	May 2019	0.800	May 2020	0.800	May 2021	-		0.800	Continuing	Continuing	-
46 Test Squadron	PO	46 TS/OGEX : Eglin AFB, FL	-	0.369	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	-
CDL Exercise Support	MIPR	Various : Various	-	0.000		0.500	Dec 2019	0.500	Dec 2020	-		0.500	Continuing	Continuing	-
<b>Subtotal</b>			-	1.179		1.300		1.300		-		1.300	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMO/Service- MITRE Engineering Direct Mission Support (FFRDC)	SS/CPFF	MITRE Corp. : Bedford, MA	-	6.029	Nov 2018	5.800	Oct 2019	5.750	Oct 2020	-		5.750	Continuing	Continuing	-
PMA - PMO Support (A&AS)	C/CPFF	Various : Various, MA	-	2.083	Nov 2018	3.500	Nov 2019	3.422	Nov 2020	-		3.422	Continuing	Continuing	-
PMA - Under Threshold Program Mgmt/Tech Support	Various	Various : Various	-	0.364	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	8.476		9.300		9.172		-		9.172	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		-	41.880	36.910	39.293	39.293	Continuing	Continuing	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>	<b>Project (Number/Name)</b> 641334 / <i>Common Data Link (CDL)</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Common Data Link</b>																												
CDL Technology Advancement																												
-CDL Protective Waveform (LPD/AJ) Advancement																												
-Mesh Network Advancement																												
CDL Specification Development, Validation, Test and Maintenance																												
- CDL Compliance Test Set																												
CDL Cryptographic Modernization																												
- Multi-algorithm US/Coalition crypto core modules (Generation 2)																												
- High Data Rate (Mega)																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>	<b>Project (Number/Name)</b> 641334 / <i>Common Data Link (CDL)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Common Data Link</b>				
CDL Technology Advancement	1	2019	4	2025
-CDL Protective Waveform (LPD/AJ) Advancement	1	2019	4	2024
-Mesh Network Advancement	1	2019	4	2024
CDL Specification Development, Validation, Test and Maintenance	1	2019	4	2025
- CDL Compliance Test Set	1	2019	1	2022
CDL Cryptographic Modernization	1	2019	4	2023
- Multi-algorithm US/Coalition crypto core modules (Generation 2)	1	2019	4	2023
- High Data Rate (Mega)	3	2019	4	2023

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305251F / <i>Cyberspace Operations Forces and Force Support</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	35.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	35.000
646008: <i>US Cyber Command Technology Development</i>	-	0.000	35.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	35.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Note**

In FY2021, PE 0305251F, Cyberspace Operations Force and Force Support, Project 646008, US Cyber Command Technology Development, efforts were transferred to PE 0208087F, Distributed Cyber Warfare Operations, Project 674540, Cyber Tech Projects - Payloads to consolidate prototyping and development of cyber payload capabilities.

**A. Mission Description and Budget Item Justification**

Foundational Tools provide advanced cyber warfare capabilities to the Air Force Cyber Mission Forces in direct support of US Cyber Command (USCYBERCOM), AF Major Commands (MAJCOMs), unified commands, and national agency cyber warfighting requirements. Activities within the program deliver operations-ready cyberspace superiority capabilities through the research, development, testing, evaluation, accelerated prototyping, demonstration, and fielding of cyber technologies and capabilities. This program enables Combatant Commanders the ability to operate in and through cyberspace to manipulate, disrupt, deny, degrade, or destroy targeted computers, information systems, and networks.

Capabilities prototyped and developed in this program are incorporated into the Air Force Distributed Cyber Warfare Operations (DCWO) portfolio. The DCWO portfolio enables delivery of cyber effects to Combatant Commanders to include cyber operational preparation of the environment, offensive counter-cyber, cyber-attack, electronic warfare operations, mission planning, intelligence, cybersecurity products and services and Command and Control/Situational Awareness (C2SA) tools needed to attack enemy networks, telephony, Integrated Air Defense Systems (IADS), command and control systems, and create cyber effects through the Electromagnetic Spectrum (EMS).

This program element may include necessary civilian pay expenses required to manage, execute, and deliver CMF Foundational Tool weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0305251F I Cyberspace Operations Forces and Force Support
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	35.000	43.000	0.000	43.000
Current President's Budget	0.000	35.000	0.000	0.000	0.000
Total Adjustments	0.000	0.000	-43.000	0.000	-43.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-43.000	0.000	-43.000

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> CMF Foundational Tools	0.000	35.000	0.000	0.000	0.000
<p><b>Description:</b> The CMF Foundational Tools program develops a family of foundational cyber tool prototypes at scale ready for integration and operational test in the Distributed Cyber Warfare Operations (DCWO) portfolio. This effort equips the Air Force portion of the Cyber Mission Force support strategy, and significantly leverages joint partnerships with US Cyber Command, other service development offices, and other government agencies. Details of specific tool development efforts are classified and will be provided on a need to know basis. For further information please contact AFLCMC/HNCO, 210-925-6614.</p>					
<p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- Expand FY18-FY19 USCYBERCOM-funded efforts to produce prioritized family of foundational tools.</li> <li>- Develop additional tool development software factories.</li> <li>- Transition and integrate available prototype tool kits to DCWO portfolio.</li> <li>- Deliver prototype tools into USCYBERCOM architecture to ensure interoperability.</li> <li>- Develop automated testing and information assurance support tools.</li> </ul>					
<p><b>FY 2021 Base Plans:</b></p>					

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305251F / <i>Cyberspace Operations Forces and Force Support</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Refer to PE 0208087F, Project 67451. -In FY2021 Project 64008 transferred to PE 0208087F, Project 67451, Cyber Tech Projects - Payloads  <b>FY 2021 OCO Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> See PE 0208087F for further details on funding.					
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	35.000	0.000	0.000	0.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

The CMF foundational tools program is aligned within the Distributed Cyber Warfare Operations (DCWO) program office. This program serves to create foundational tool prototypes at scale to enable the DCWO program office to quickly integrate and transition those tools into available operational capability. The foundational tools program office will utilize Concept, Development, Risk Management, Production, or Deployment Plans as part of a streamlined approach to acquisition planning. All plans will contain sufficient information for the Milestone Decision Authority (MDA) to determine readiness to enter into the applicable phase of the acquisition process. Foundational Tools prototyping efforts will be used in conjunction with the DCWO program to buy-down acquisitions risk and identify both new large-scale foundational efforts as well as short projects to leverage government and commercial solutions. The program will utilize both new and existing contractual vehicles, such as Government-Wide Acquisition Contract (GWAC) vehicles (Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV (SEWP IV)), and General Services Administration (GSA) Federal Supply Schedules and a Cyber Indefinite Delivery Indefinite Quantity (IDIQ) contract. The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that should be able to meet many requirements related to Offensive Cyberspace Operations. These multiple-award contractual vehicles have already met the statutory requirements of the Competition in Contracting Act (CICA), which requires a fair opportunity to all contract holders, in accordance with Federal Acquisition Regulation (FAR) 16.505, unless an exception to fair opportunity applies.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305251F / <i>Cyberspace Operations Forces and Force Support</i>	<b>Project (Number/Name)</b> 646008 / <i>US Cyber Command Technology Development</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CMF Foundational Tool Development	Various	Various : Various	-	-		22.200	Jan 2020	-		-		-	0.000	22.200	-
Interoperability Development	Various	Various : Various	-	-		3.100	Feb 2020	-		-		-	0.000	3.100	-
Automated Test Development	Various	Various : Various	-	-		3.000	Jan 2020	-		-		-	0.000	3.000	-
<b>Subtotal</b>			-	-		28.300		-		-		-	0.000	28.300	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CMF Foundational Tool Testing	MIPR	47 CTS : San Antonio, TX	-	-		2.900	Jan 2020	-		-		-	0.000	2.900	-
<b>Subtotal</b>			-	-		2.900		-		-		-	0.000	2.900	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CMF Foundational Tool PSC (A&AS, FFRDC)	C/Various	Various : Various	-	-		3.800	Jan 2020	-		-		-	0.000	3.800	-
<b>Subtotal</b>			-	-		3.800		-		-		-	0.000	3.800	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	-	35.000	-	-	-	0.000	35.000	N/A

**Remarks**



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305251F / <i>Cyberspace Operations Forces and Force Support</i>	<b>Project (Number/Name)</b> 646008 / <i>US Cyber Command Technology Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>CMF Foundational Tools</b>				
CMF Foundational Tool Development	2	2020	4	2021
Interoperability Development	2	2020	4	2021
Automated Test Development	2	2020	4	2021

**Note**

See continuation of effort in PE 0208087F.



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305601F / <i>Mission Partner Environments</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	9.694	8.550	11.430	0.000	11.430	16.667	17.053	17.350	16.398	Continuing	Continuing
643783: <i>CENTRIXs Networks</i>	-	9.694	8.550	11.430	0.000	11.430	16.667	17.053	17.350	16.398	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Mission Partner Environment (MPE) enables secure sharing of operational information for collaboration between and among the United States (US) and mission partners to include federal, state, local, and tribal agencies, allies, coalition members, host nations, and other nations, US and international Non-Governmental Organizations, multinational treaty organizations, and private sector organizations. MPE enables the US Department of Defense (DoD) to execute its assigned missions with mission partners across all phases of operations to assist combined command and control (C2) of coalition forces while meeting the information sharing requirements within existing bi-lateral and multi-lateral agreements. Also, it promotes effective information exchange and provides applications to enable effective use of the US and Partner nation military power. MPE provides the warfighter mission with technology to improve mission effectiveness and cyber security.

Directive-type Memorandum (DTM) 19-002 transferred the MPE capabilities of the Combined Enterprise Regional Information Exchange System (CENTRIXS), Pegasus, the All Partners Access Network (APAN), the Combined Federal Battle Labs Network (CFBLNet) and three Virtual Data Centers (VDC), previously referred to as MPE Information Systems, to the USAF as the DoD Executive Agent for MPE. This effort increases combat effectiveness by leveraging capabilities and information from all partners. FY2021 funding procures hardware and software to support the rationalization, consolidation and modernization of a common mission network capability that supports operations with the MPE.

This funding supports the testing, integration, and delivery of procedures, workstations, switches, servers, cross-domain services, communications infrastructure, video teleconference suites, network equipment, storage and backup, encryption equipment, software licenses, infrastructure, deployable suites and software communications. Variations in quantity and unit price reflect planned capital investment. This funding further supports Coalition Interoperability Assurance and Validation (CIAV) technical, analytical, and engineering support to resolve C2 interoperability challenges and evaluate existing and emerging cyber capabilities and the development of the National Information Exchange Model (NIEM) in support of the MPE ecosystem.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0305601F I Mission Partner Environments
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	10.074	8.550	9.076	0.000	9.076
Current President's Budget	9.694	8.550	11.430	0.000	11.430
Total Adjustments	-0.380	0.000	2.354	0.000	2.354
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.380	0.000	2.354	0.000	2.354

**Change Summary Explanation**

FY20 to FY21 increase to meet expanded capabilities in mission sets.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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<b>Title:</b> Mission Partner Environment	9.694	8.550	11.430
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**Description:** Mission Partner Environment (MPE) enables secure sharing of operational information for collaboration between and among the United States (US) and mission partners to include federal, state, local, and tribal agencies, allies, coalition members, host nations, and other nations, US and international Non-Governmental Organizations, multinational treaty organizations, and private sector organizations.

***FY 2020 Plans:***

Program is developing, integrating, and testing of core interoperable C2 mission capabilities with increased capacities and increased interoperability between cross national, cross organizational, and cross domain accreditation boundaries with continuous assured enterprise-wide service operations in all phases.

Additional efforts are developing, integrating, and testing an enterprise architectural engineering solution that is combining multiple coalition information sharing capabilities into a single Mission Partner Environment, to include modifications necessary to absorb legacy systems capabilities and capacities. The work includes technical, analytical, and engineering support to resolve C2 interoperability challenges and the development of an MPE ecosystem in compliance with the National Information Exchange Model (NIEM).

***FY 2021 Plans:***

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305601F / <i>Mission Partner Environments</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
Continue development, integration, and testing of core C2 mission capabilities with increased capacities and integration into the cross national, cross organizational, and cross domain accreditation for C2 mission capabilities, and continuity of operations for enterprise services.			
Continue development, integration, and testing of an enterprise architectural engineering solution to combine multiple coalition information sharing capabilities into a single Mission Partner Environment, to include modifications necessary to absorb legacy systems capabilities and capacities.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Funds increased due to user requirements for an increase in mission set upgrades.			
<b>Accomplishments/Planned Programs Subtotals</b>	9.694	8.550	11.430

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• O&M PE 0305601F: <i>Mission Partner Environment</i>	85.963	88.717	109.053	-	109.053	132.624	141.967	144.483	146.847	Continuing	Continuing
• OPAF 03 834010: <i>General Information Technology</i>	1.873	1.585	0.478	-	0.478	1.773	1.955	1.991	2.028	Continuing	Continuing

**Remarks**  
N/A

**E. Acquisition Strategy**  
Performance-based contracts are primarily used for this support. MPE maximizes the use of competitive awards and uses various contract types, employs large and small contractors, and is focused to achieve agency socio-economic goals and incorporate DoD acquisition reform initiatives.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305601F / <i>Mission Partner Environments</i>	<b>Project (Number/Name)</b> 643783 / <i>CENTRIXs Networks</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Cross Domain Solution Ops Capabilites	C/FFP	MITRE Corporaton : McLean, VA	-	9.694	Mar 2019	8.550	Mar 2020	11.430	Mar 2021	-		11.430	Continuing	Continuing	-
<b>Subtotal</b>			-	9.694		8.550		11.430		-		11.430	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	9.694		8.550		11.430		-		11.430	Continuing	Continuing	N/A

**Remarks**  
N/A

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305601F / <i>Mission Partner Environments</i>	<b>Project (Number/Name)</b> 643783 / <i>CENTRIXs Networks</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

*Development, testing of capabilities, and integration of capacities into mission capabilities with continuity of operations for enterprise services*

Mission Partner Environment

*Development, integration & testing of an architectural engineering solution to combine coalition sharing capabilities into a single environment, to modify legacy systems capabilities and capacities*

Mission Partner Environment

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305601F / <i>Mission Partner Environments</i>	<b>Project (Number/Name)</b> 643783 / <i>CENTRIXs Networks</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Development, testing of capabilities, and integration of capacities into mission capabilities with continuity of operations for enterprise services</i>				
Mission Partner Environment	1	2019	4	2024
<i>Development, integration &amp; testing of an architectural engineering solution to combine coalition sharing capabilities into a single environment, to modify legacy systems capabilities and capacities</i>				
Mission Partner Environment	1	2019	4	2025

**Note**  
N/A

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>					<b>R-1 Program Element (Number/Name)</b>							
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					PE 0306250F / <i>Cyber Operations Technology Development</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	237.393	202.364	259.823	0.000	259.823	256.961	242.740	232.599	237.271	Continuing	Continuing
646008: <i>US Cyber Command Technology Development</i>	-	237.393	202.364	259.823	0.000	259.823	256.961	242.740	232.599	237.271	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY2020, elements of PE 0306250F, Cyber Operations Technology Development, Project Joint Common Services efforts were transferred to PE 0208097F, Joint Cyber Command and Control, in order to increase clarity and delineation from other activities.

**A. Mission Description and Budget Item Justification**

US Cyber Command's (USCYBERCOM) mission is to deter or defeat strategic threats to US interests and infrastructure, provide mission assurance for the operations and defense of the Department of Defense information environment, and support the achievement of Joint Force Commander objectives.

USCYBERCOM in conjunction with the Services and National Agencies will develop and expand infrastructure architectures and capabilities/tools to support Cyber Mission Forces (CMF). Focus is on four broad program areas: Common Services, Access Platforms, Tools, and Sensors.

The specific details and aspects of these cyber activities are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-634-7769.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	246.502	198.864	245.293	0.000	245.293
Current President's Budget	237.393	202.364	259.823	0.000	259.823
Total Adjustments	-9.109	3.500	14.530	0.000	14.530
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	3.500			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-9.107	0.000			
• Other Adjustments	-0.002	0.000	14.530	0.000	14.530

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0306250F / <i>Cyber Operations Technology Development</i>
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 646008: *US Cyber Command Technology Development*  
Congressional Add: *Cloud Communications Validation Pilot*

	FY 2019	FY 2020
Congressional Add Subtotals for Project: 646008	-	3.500
Congressional Add Totals for all Projects	-	3.500

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><b>Title:</b> Joint Common Services</p> <p><b>Description:</b> Progressed the Joint Cyber Warfighting Architecture (JCWA) to enable split-based offensive and defensive operations.</p> <p>Provided enrichment of USCYBERCOM Title 10 data with additional Title 50 sources.</p> <p>Continued development of technologies, policies, and processes needed to enable Intelligence and "indicator" sharing across the DODIN tiers and domains.</p> <p>Established an enterprise platform-as-a-service cloud platform capability to provide end-user access, central services, networking, security services, governance, and a certification and accreditation strategy for all projects and capabilities deployed within USCYBERCOM Cloud environment on the Unclassified network.</p> <p>The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-634-7769.</p> <p><b>FY 2020 Plans:</b> Continue the development of the Joint Cyber Warfighting Architecture (JCWA) as the common joint capability to enable split-based, offensive and defensive operations.</p> <p>Continue development of USCYBERCOM cross-domain solutions that enable automated data flow from access platforms to data repositories and enable enrichment of data and reporting across security domains. Expand Cross domain solution to provide additional hardware capacity and continuity of operations.</p>	48.462	36.389	46.257	0.000	46.257



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0306250F / <i>Cyber Operations Technology Development</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Expand the enterprise platform-as-a-service cloud platform capability to provide end-user access, central services, networking, security services, governance, and a certification and accreditation strategy for all projects and capabilities deployed within USCYBERCOM Cloud environments, to include SECRET and TOP SECRET Networks. Expand the common services offered and improve security posture through increased Cloud Defense.</p> <p>Continue development of technologies, policies, and processes needed to enable Intelligence and "indicator" sharing across the DODIN tiers and domains.</p> <p>Provide enrichment of USCYBERCOM Title 10 data with additional Title 50 sources.</p> <p>Drive standards and interoperability of JCWA.</p> <p>Provide critical support to a developing and maturing Acquisition and Contracting entities and improve the efficiency and effectiveness of program management and acquisition processes.</p> <p>Some aspects of the efforts are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM, 443-634-7769.</p> <p><b>FY 2021 Base Plans:</b> Will continue the development of the JCWA as the common joint capability to enable split-based, offensive and defensive operations.</p> <p>Will continue development of USCYBERCOM cross-domain solutions that enable automated data flow from access platform to data repository and enable enrichment of data and reporting across security domains.</p> <p>Will continue development of technologies, policies, and processes needed to enable Intelligence and "indicator" sharing across the DODIN tiers and domains.</p> <p>Provide enrichment of USCYBERCOM Title 10 data with additional Title 50 sources.</p> <p>Drive standards and interoperability of JCWA.</p>					

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0306250F / <i>Cyber Operations Technology Development</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Provide critical support to a developing and maturing Acquisition and Contracting entities and improve the efficiency and effectiveness of program management and acquisition processes.</p> <p>Some aspects of the efforts are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM, 443-634-7769.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase due to alignment of resources within JCWA capability areas.</p>					
<p><b>Title:</b> Joint Access Platforms</p> <p><b>Description:</b> Completed Infrastructure Capabilities Based Assessment(CBA) identifying 11 capability gaps to inform formal requirements documentation in order to formally establish program of record a joint cyber access program (JCAP).</p> <p>Completed a Robust Infrastructure study to inform FY20 resourcing decision to transition from legacy on-net fixed site infrastructures to one JCAP solution in order to save time and resources in future year investments.</p> <p>Continued development and deployment of the on-net operations infrastructure used to conduct Title 10 cyberspace operations.</p> <p>Continued development of capabilities to enable systems to provide client/server architecture to deliver multiple mission-based cyber effects.</p> <p>Continued development of operational system that delivers distributed denial of service (DDoS) capabilities on the DODIN.</p> <p>The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-634-7769.</p> <p><b>FY 2020 Plans:</b> Continue development and deployment of on-net operations infrastructure.</p>	84.249	68.679	72.792	0.000	72.792

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0306250F / <i>Cyber Operations Technology Development</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Continue to develop improvements for client/server platforms that delivers multiple mission-based cyber effects.</p> <p>Continue development of operational system that delivers distributed denial of service (DDoS) capabilities on the Department Of Defense Information Network (DODIN).</p> <p>Some aspects of the efforts are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM, 667-812-0814.</p> <p><b>FY 2021 Base Plans:</b> Will continue development and deployment of on-net operations infrastructure.</p> <p>Will continue to develop improvements for client/server platforms that delivers multiple mission-based cyber effects.</p> <p>Will continue development of operational system that delivers distributed denial of service (DDoS) capabilities on the Department Of Defense Information Network (DODIN).</p> <p>Some aspects of the efforts are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM, 667-812-0814.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 funding level is a result of a FY20 re-phasing to properly align funding with development effort timelines.</p>					
<p><b>Title:</b> Joint Tools</p> <p><b>Description:</b> Delivered foundational components of unique toolkit capability packages with multiple components designed to support Service Cyber Component (SCC) Offensive Cyber Operations (CO) activities, while initiating the development of additional toolkits in support of Cyber National Mission Force operations.</p> <p>Completed delivery of new exploitation frameworks and provided new exploitation capabilities available for integration into the frameworks for specified CO.</p>	98.520	86.388	117.974	0.000	117.974

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0306250F / <i>Cyber Operations Technology Development</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Integrated Foundational Tools, which are awaiting Operational Evaluation.</p> <p>Continued the support to research signature diversity and further develop signature measurement capabilities.</p> <p>Installed equipment to support Personal Security Product (PSP) Testing Services.</p> <p>Maintained the Unified Cyber Analysis Portal (UCAP) while gathering and refining requirements in support of ROBOTICKNIGHT, which will provide USCYBERCOM with an organic cyberspace intelligence platform for malware cataloging, analysis, and reverse engineering.</p> <p>The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-634-7769.</p> <p><b>FY 2020 Plans:</b></p> <p>Continue to deliver organically developed exploitation frameworks to the Cyber Mission Force (CMF) and provide for the integration of exploitation capabilities into the delivered framework.</p> <p>Continue to procure, discover, and integrate new exploitation capabilities as a service for the CMF.</p> <p>Continue to develop, deliver and integrate Foundational Tools into the Cyber Command architecture that will provide operational agility for CMF cyberspace operations.</p> <p>Perform Operational Evaluation and Acceptance testing of Foundational Tools.</p> <p>Transfer operationally accepted tools to the respective services for operational use, maintenance and sustainment.</p> <p>Continue to measure signatures on each spiral tool delivery to verify uniqueness of tools.</p> <p>Continue to support research of signature diversity and further develop signature measurement capabilities. Develop and update Personal Security Protection Testing Services to ensure they support current test needs.</p> <p>Continue to develop and deliver specialized tools and exploits to CMF.</p>					

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0306250F / <i>Cyber Operations Technology Development</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Some aspects of the efforts are classified and will be provided on a need to know basis. For further information, please contact USCYBERCOM, 443-634-7769.</p> <p><b>FY 2021 Base Plans:</b> Will continue to enhance and sustain exploitation frameworks supporting CMF operations based on evolving operations requirements.</p> <p>Will continue the research, development, integration, and procurement of mission-focused exploit capabilities as a service to support CMF operations.</p> <p>Will Continue to update Personal Security Protection Testing Services to ensure they support current test needs.</p> <p>Will continue to perform Operational Evaluation and Acceptance testing of Foundational Tools.</p> <p>Will continue to develop and deliver additional foundational tools suites to incrementally achieve a full complement of required capabilities. The foundational tool suites will provide operational agility for CMF cyberspace operations.</p> <p>Will continue to measure signatures on each spiral of delivered tools to verify uniqueness of tools.</p> <p>Will continue to develop and deliver specialized tools and exploits to CMF.</p> <p>Some aspects of the efforts are classified and will be provided on a need to know basis. For further information, please contact USCYBERCOM, 443-634-7769.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 funding level is a result of a FY20 re-phasing to properly align funding with development effort timelines.</p> <p><b>Title:</b> Joint Sensors</p> <p><b>Description:</b> Supported creation and development of Advanced Data Analytics that provide big data analysis tools and techniques, assist with developing target folders (to include target analysis, target system analysis,</p>					
	6.162	7.408	22.800	0.000	22.800

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0306250F / <i>Cyber Operations Technology Development</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>and network analysis), provide technical expertise on data query strategies, provide technical continuity for development efforts.</p> <p>Hunt Forward Operations provided the Cyber National Mission Forces (CNMF) unique access to networks inside adversary 2+3 actors' spheres of influence in order to enable defense and impose costs.</p> <p>Hunt Forward kits were delivered across the Cyber Protection Team forces by the Services and provided the means to better assess and defend the DoDIN.</p> <p>The origin, details and specific aspects of these efforts are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-634-7769.</p> <p><b>FY 2020 Plans:</b> Continue development and sustainment of Advanced Frameworks and accompanying Data Analytics for cyber operations.</p> <p>Conduct pilot activities to expedite implementation and operationalization of sensing capabilities, analytic capabilities, and ensure persistent defense of select Nuclear Command, Control, and Communications (NC3) mission systems along a defined mission thread. Results of the pilot will inform future operations, activities, and investments to enable persistent cyber defense of the entire NC3 enterprise.</p> <p>Many aspects of the effort are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM at 443-634-7769.</p> <p><b>FY 2021 Base Plans:</b> Will continue development and sustainment of Advanced Frameworks and accompanying Data Analytics for cyber operations.</p> <p>Leverage findings of FY20 pilot activities to implement sensors, monitoring, and analytic capabilities to enable mission owners to rapidly gain situational awareness and direct defense of NC3 networks.</p>					

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0306250F / <i>Cyber Operations Technology Development</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Many aspects of the effort are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM at 443-634-7769.					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase in resources to build initial cyber defense capabilities for Nuclear Command, Control and Communications (NC3) networks.					
<b>Accomplishments/Planned Programs Subtotals</b>	237.393	198.864	259.823	0.000	259.823

	FY 2019	FY 2020
<b>Congressional Add:</b> Cloud Communications Validation Pilot	-	3.500
<b>FY 2020 Plans:</b> Funding will acquire a capability to use transport layer identity management with non-interactive authentication at the first packet of a TCP/IP request to validate machine-to-machine communications. Such capability will "cloak" (i.e., render invisible) the existence of government networks and cloud deployments from our adversaries, while simultaneously authenticating the communication.		
<b>Congressional Adds Subtotals</b>	-	3.500

<b>D. Other Program Funding Summary (\$ in Millions)</b>						<b>Cost To</b>					
<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Complete</b>	<b>Total Cost</b>
• OPAF 03 834320: C3 Countermeasures	-	-	11.986	-	11.986	9.990	5.994	5.994	5.994	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**  
Facilitate the delivery of technology capabilities to the Cyber Mission Forces, by applying innovative solutions for existing and emerging technologies. Contracts are awarded under full and open competition whenever possible. Variations of both Fixed Price (FP) and Cost Plus (CP) contracting vehicles and the use of Other Transactional Authority (OTA) will be implemented leveraging USCYBERCOM Acquisition authorities. USCYBERCOM will also rely on various Service Component, Combatant Command and National Security Agency contracting offices for procurement of cyber capabilities and contractor support.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0306250F / <i>Cyber Operations Technology Development</i>	<b>Project (Number/Name)</b> 646008 / <i>US Cyber Command Technology Development</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/Various	Not specified. : NV	-	-		-		-		-		-	Continuing	Continuing	-
Joint Common Services	Various	Multiple Agencies : Various	-	47.512	Apr 2019	35.607	Jan 2020	45.350	Apr 2021	0.000		45.350	Continuing	Continuing	-
Joint Access Platforms	Various	Multiple Agencies : Various	-	83.290	Apr 2019	67.897	Jan 2020	71.963	Apr 2021	0.000		71.963	Continuing	Continuing	-
Joint Tools	Various	Multiple Agencies : Various	-	97.628	Apr 2019	85.606	Jan 2020	116.906	Apr 2021	0.000		116.906	Continuing	Continuing	-
Joint Sensors	Various	Multiple Agencies : Various	-	5.514	Apr 2019	6.629	Jan 2020	20.402	Apr 2021	0.000		20.402	Continuing	Continuing	-
Cloud Communication Validation Pilot	TBD	TBD : TBD	-	-		3.500	Jun 2020	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	233.944		199.239		254.621		0.000		254.621	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
PMA	Various	Various : Various	-	3.449	Apr 2019	3.125	Jan 2020	5.202	Apr 2021	0.000		5.202	Continuing	Continuing	-
<b>Subtotal</b>			-	3.449		3.125		5.202		0.000		5.202	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	237.393	202.364	259.823	0.000	259.823	Continuing	Continuing	N/A

**Remarks**





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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0306250F / <i>Cyber Operations Technology Development</i>	<b>Project (Number/Name)</b> 646008 / <i>US Cyber Command Technology Development</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

10. Foundational tool suites (spirals annual) - (Joint Tools, formerly Combatant Command Support and Operate and Defend the DODIN)																										
11. Analytics development (Joint Analytic, formerly Combatant Command Support and Operate and Defend the DODIN)																										
12. Cloud Communication Validation Pilot																										

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0306250F / <i>Cyber Operations Technology Development</i>	<b>Project (Number/Name)</b> 646008 / <i>US Cyber Command Technology Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Cyber Operations Technology Development</i></b>				
1. Data analytics platform next GEN (Joint Common Services)	1	2019	2	2020
2. CYBERCOM access platform IOC (Joint Access Platforms, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2019
3. CYBERCOM access platform build out capacity (Joint Access Platforms, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2024
4. Cyber data flow cross domain solution (Joint Access Platforms, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2019
5. Mission-based platform FOC (Joint Access Platforms, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	3	2022
6. DDoS for DODIN sustain (Joint Access Platforms, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2019
7. DDoS for DODIN spiral development (Joint Access Platforms)	1	2019	4	2025
8. Cyber UCAP spiral development - 1 (Tools)	3	2019	2	2021
9. Exploitation framework spiral development (annual) - (Joint Tools, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2025
10. Foundational tool suites (spirals annual) - (Joint Tools, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2025
11. Analytics development (Joint Analytic, formerly Combatant Command Support and Operate and Defend the DODIN)	1	2019	4	2025
12. Cloud Communication Validation Pilot	3	2020	3	2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0306415F / <i>Enabled Cyber Activities</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	15.728	16.632	10.560	0.000	10.560	17.242	17.551	17.864	18.192	Continuing	Continuing
646008: <i>US Cyber Command Technology Development</i>	-	15.728	16.632	10.560	0.000	10.560	17.242	17.551	17.864	18.192	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

US Cyber Command's (USCYBERCOM) mission is to deter or defeat strategic threats to US interests and infrastructure, provide mission assurance for the operations and defense of the Department of Defense information environment, and support the achievement of joint force commander objectives.

USCYBERCOM develops or procures capabilities to enable Electronic Warfare and cyber-peculiar technologies for use by the Cyber Mission Forces (CMF).

The specific details and aspects of these cyber activities are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM at 443-634-7769.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	16.325	16.632	16.917	0.000	16.917
Current President's Budget	15.728	16.632	10.560	0.000	10.560
Total Adjustments	-0.597	0.000	-6.357	0.000	-6.357
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.597	0.000			
• Other Adjustments	0.000	0.000	-6.357	0.000	-6.357

**Change Summary Explanation**

The FY2021 funding request was reduced by \$6.357M to account for the availability of prior year execution balances.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0306415F / <i>Enabled Cyber Activities</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><b>Title:</b> Cyber Technology Development</p> <p><b>Description:</b> Adapted Electronic Warfare (EW) technology to facilitate the development and delivery of EW and cyber-peculiar capabilities.</p> <p>The origin, details and specific aspects of these efforts are classified.</p> <p><b>FY 2020 Plans:</b> Continue to adapt technology to facilitate the development and delivery of EW and cyber-peculiar capabilities.</p> <p>Establish WRECKINGBALL's Open Component Portability Infrastructure (CPI) program as USCYBERCOM's RF framework to develop Title 10 off-net RF effects.</p> <p>Deliver adapted EW weapons platforms to support Offensive Cyber Operations by leveraging research and development investments made in FY19.</p> <p>The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis. For further information please contact USCYBERCOM at 443-634-7769.</p> <p><b>FY 2021 Base Plans:</b> Will continue to adapt EW technology and cyber-peculiar capabilities to gain access to targeted enemy forces.</p> <p>Continue to enhance the open source Open CPI framework that will allow the services and USCYBERCOM to develop Title 10 off-net effects.</p> <p>Continue to migrate segregated capabilities and Cyber/EW weapons systems onto Common Attack Platforms by implementing common frameworks and common hosting solutions.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Reduction in FY21 to properly align funding with development effort timelines.</p>	15.728	16.632	10.560	0.000	10.560

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0306415F / <i>Enabled Cyber Activities</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Many aspects of the effort are classified and will be provided on a need-to-know basis. For further information please contact USCYBERCOM at 443-634-7769.					
<b>Accomplishments/Planned Programs Subtotals</b>	15.728	16.632	10.560	0.000	10.560

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

Facilitate the delivery of new Electronic Warfare (EW) cyber capability, by applying innovative solutions for existing and emerging technologies. Contracts are awarded under full and open competition whenever possible. Variations of both Fixed Price (FP) and Cost Plus (CP) contracting vehicles will be executed and managed by USCYBERCOM Acquisition authority, as well as various Service Component contracting offices, other Defense Agency contracting offices and the National Security Agency contracting offices.





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0306415F / <i>Enabled Cyber Activities</i>	<b>Project (Number/Name)</b> 646008 / <i>US Cyber Command Technology Development</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Electronic Warfare (EW) Capabilities</i></b>	
EW Capability Spiral (annual)	
SATCOM Capability Spiral (annual)	
Communications Capabiliy Spiral (annual)	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0306415F / <i>Enabled Cyber Activities</i>	<b>Project (Number/Name)</b> 646008 / <i>US Cyber Command Technology Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Electronic Warfare (EW) Capabilities</i></b>				
EW Capability Spiral (annual)	1	2019	4	2025
SATCOM Capability Spiral (annual)	1	2019	4	2025
Communications Capabiliy Spiral (annual)	1	2019	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0401310F / <i>C-32 Executive Transport Recapitalization</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	9.908	0.000	9.908	9.938	10.116	10.296	0.000	0.000	40.258
640009: <i>C-32 Executive Transport Recap</i>	-	0.000	0.000	9.908	0.000	9.908	9.938	10.116	10.296	0.000	0.000	40.258
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

NOTE: FY18-20 Prior Years Funding of \$18.837M was executed in Program Element 040130F, BPAC 654019, BA05.

The C-32A mission is to provide Executive Airlift transportation for the First Lady, Vice President, Cabinet, Congress, and foreign Heads of State. The C-32A also serves as the backup to the VC-25 Presidential support aircraft.

The C-32A Executive Transport Recapitalization program will replace the aging C-32A aircraft fleet. The Air Force and Navy engaged in an effort to recapitalize the National Military Command System fixed-wing aircraft and large capacity Executive Airlift fleets. The affected platforms consist of the Air Force E-4B National Airborne Operations Center (NAOC), Air Force C-32A Executive Airlift (EA), and the Navy E-6B Airborne Command Post (ABNCP) and Take Charge and Move Out (TACAMO) aircraft. These platforms are aging and increasingly difficult to support. The combined effort explored the realignment of missions among platforms and examined the potential benefits of acquiring common airframes without degrading operational effectiveness or increasing overall costs. This was conducted through the NEAT (N=NAOC, E=EA, A= ABNCP, T=TACAMO) Analysis of Alternatives (AoA).

This budget supports funding to complete a joint service AoA in collaboration with the E-4B and E-6B Recapitalization programs to explore commonality of the airframe and interoperability of the mission equipment. Funding continues establishment of the Program Office and matures the development of the acquisition strategy. Funding also supports cost/performance trade studies and risk reduction activities.

Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortage (DMSMS) issues.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver C-32A weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0401310F I C-32 Executive Transport Recapitalization
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	9.908	0.000	9.908
Total Adjustments	0.000	0.000	9.908	0.000	9.908
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	9.908	0.000	9.908

**Change Summary Explanation**

In FY 2021 for PE 0401310F, C-32 Executive Transport Recapitalization, Project 640009, C-32 Executive Transport Recap efforts were transferred from PE 0401310F, C-32 Executive Transport Recapitalization, Project 654019, C-32 Executive Transport Recap, in order to reflect the appropriate budget activity for these funds.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> C-32A Executive Transport Recapitalization Materiel Development Decision (MDD)	0.000	0.000	7.000
<b>Description:</b> Refine AoA activities to assess potential materiel solutions and inform the Materiel Development Decision (MDD) to mitigate current capability gaps.			
<b>FY 2020 Plans:</b> Funding for this effort was executed in BA05 within PE 0401310F.			
<b>FY 2021 Plans:</b> Funds in FY21 will refresh AoA analysis and studies to inform technical risk areas, continue Materiel Development Decision (MDD) activities, advance material solution analysis, conduct technology maturation risk reduction activities, prepare the acquisition strategy, and begin the Capability Development Document (CDD).			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY20 prior year funding was executed in BA05 within PE 0401310F.			
<b>Title:</b> C-32 Executive Transport Recapitalization Program Office Standup	0.000	0.000	2.908
<b>Description:</b> Continue standup of Program Office to support AoA closeout and early acquisition activities.			

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0401310F I C-32 Executive Transport Recapitalization
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>FY 2020 Plans:</b> Funding for this effort was executed in BA05 within PE 0401310F.</p> <p><b>FY 2021 Plans:</b> Funds in FY2021 continue support of the Materiel Development Decision (MDD), conduct early acquisition activities, Program Office support tasks, A&amp;AS costs, travel, and PMA</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY20 prior year funding was executed in BA05 within PE 0401310F.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	9.908

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 05 0401310F: C-32 <i>Executive Transport Recapitalization</i>	5.989	9.930	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	15.919

**Remarks**

**E. Acquisition Strategy**

Post AoA MDD for acquisition strategy planned for 1st quarter 2021. Early acquisition strategy will include technology maturation risk reduction phase and follow-on Pre-MS B entry.

- Early focus on Technology Maturation Risk Reduction on critical performance capabilities identified during material solution analysis phase (AoA) to support technical maturity of key capability areas identified via the AoA assessments and analysis and inform requirements for CDD generation
- Risk reduction activities and technology maturity assessments outcome will be used to further develop acquisition strategy for a Pre-milestone B entry and subsequent solicitation for a full and open competition

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0401310F / C-32 Executive Transport Recapitalization	<b>Project (Number/Name)</b> 640009 / C-32 Executive Transport Recap
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Product Development	C/TBD	TBD : TBD	-	0.000		0.000		-		-		-	Continuing	Continuing	-
C-32 Executive Transport Recapitalization: Analysis of Alternatives	MIPR	TBD : TBD	-	0.000		0.000		7.000	Apr 2021	-		7.000	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		0.000		7.000		-		7.000	Continuing	Continuing	N/A

**Remarks**  
FY18-20 Prior Years Funding was executed in PE 040130F, BPAC 654019, BA05

<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
C-32 Executive Transport Recapitalization: PMA Contractor Services and PMA Other Government Costs	Various	TBD : Dayton, OH	-	0.000		0.000		2.908	Jan 2021	-		2.908	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		0.000		2.908		-		2.908	Continuing	Continuing	N/A

**Remarks**  
FY18-20 Prior Years Funding of was executed in PE 040130F, BPAC 654019, BA05

<b>Project Cost Totals</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
	-	0.000	0.000	9.908	-	9.908	Continuing	Continuing	N/A

**Remarks**  
-FY2018-2020 RDT&E Funding (\$18.837M) was executed in PE 0401310F, BPAC 654019, BA05

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0401310F / C-32 Executive Transport Recapitalization	<b>Project (Number/Name)</b> 640009 / C-32 Executive Transport Recap

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>C-32 Recap</b>																												
Acquisition Strategy Development									■																			
Post AoA MDD									■																			
Staff Report									■																			
Capability Development Document (CDD)													■															
Technology Maturation Risk Reduction													■															

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0401310F / C-32 Executive Transport Recapitalization	<b>Project (Number/Name)</b> 640009 / C-32 Executive Transport Recap

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>C-32 Recap</b>				
Acquisition Strategy Development	1	2021	1	2021
Post AoA MDD	1	2021	1	2021
Staff Report	1	2021	1	2021
Capability Development Document (CDD)	2	2021	2	2022
Technology Maturation Risk Reduction	2	2021	4	2024

**Note**

This R-4 reflects EMD ending fourth quarter 2025. The EMD schedule begins the third quarter of 2025 and ends the fourth quarter of 2027. System limitations do not reflect schedules extending beyond 2025.



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0901410F / <i>Contracting Information Technology System</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	16.998	20.830	8.662	0.000	8.662	20.648	13.787	14.040	14.102	Continuing	Continuing
643483: <i>CON-IT</i>	-	16.998	20.830	8.662	0.000	8.662	20.648	13.787	14.040	14.102	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Contracting Information Technology (CON-IT) system replaces aging legacy contract writing and management systems with a single contract management system to support the global Air Force mission. CON-IT will consolidate all contract writing, management, and reporting capabilities, as well as provide interoperability across all contracting communities (base operations, logistics, contingency, research and development, and weapons systems). As of FY19, CON-IT has replaced Standard Procurement System, and will replace O'Contrax, ConWrite, and Automated Contract Preparation System, as well as six supporting systems.

CON-IT allows for a standardized and integrated method of anticipating and responding to the changing pace and dynamic nature of processes, regulations, and technologies across the contracting domain. CON-IT also empowers the contracting community to fully support compliance with financial auditability and Financial Improvement Audit Readiness goals that depend on the integrity of the data flow through the Procure to Pay process.

CON-IT capabilities are developed, deployed, and enhanced under an agile software development method, enabling strategic sourcing and other acquisition efficiencies by standardizing data, business rules, and milestone tracking. The CON-IT Integrated Program Office's (IPO) agile framework allows for gap requirements to be addressed through an iterative process of sprint development cycles, after which usable capability is produced and deployed to operational users. The IPO construct, along with application of an agile framework, allows the program to properly plan system requirements, deliver early capability to the end users, achieve early return on investment of taxpayer dollars, mitigate risk, reduce waste, effectively respond to change, and continuously improve processes.

CON-IT's configuration baseline is built upon the Defense Information Systems Agency's Integrated Defense Enterprise Acquisition System contract writing system, a Government-off-the-Shelf product running on a Commercial Off-the-Shelf platform, Appian Business Process Management. Through an interagency agreement, the CON-IT IPO partnered with the United States Department of Agriculture's (USDA) Enterprise Application Services (EAS) team to develop, test, validate, deploy, and maintain CON-IT. Data Center Hosting Services, managed and operated by the Digital Infrastructure Services Center, provides and maintains the development and production environments in the USDA Enterprise Data Centers.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver contract management system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

As directed in the FY 2019 National Defense Authorization Act (NDAA), Section 825, amendment to Public Law 114-92 FY 2016 NDAA, Section 828 Penalty for Cost Overruns, the FY 2020 AF penalty total is \$50.0M The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	PE 0901410F / <i>Contracting Information Technology System</i>

Funds will be used to perform studies and innovative integration efforts for common technology capabilities such as cloud migration, technology development and mobile application.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	17.577	20.830	5.672	0.000	5.672
Current President's Budget	16.998	20.830	8.662	0.000	8.662
Total Adjustments	-0.579	0.000	2.990	0.000	2.990
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.579	0.000	2.990	0.000	2.990

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> CON-IT System Development	16.998	20.830	8.662
<b>Description:</b> Initiated in FY 2017, CON-IT is delivering contracting capability to the operational contracting community at the speed of relevance through the Integrated Program Office's agile development execution. The CON-IT IPO established early user engagement through a series of subject matter expert familiarization events, in which system capabilities produced from each sprint cycle are tested by operational contracting officers (COs) and valuable user feedback is collected and incorporated into the program's requirements backlog. In FY 2018, the CON-IT IPO achieved Early Operational Capability (EOC) with initial deployment of CON-IT capabilities to 12th AF and subsequent EOC deployment to eight additional operational locations across the AF in every Major Command, except United States Air Forces in Europe. In FY 2019, CON-IT was deployed AF-wide across 96 sites globally, and supported more than 3,500 contracting specialists and contracting officers (COs), resulting in more than 44,000 contract actions awarded. CON-IT successfully subsumed Standard Procurement System (SPS), resulting in sun setting SPS 26 months ahead of schedule, and delivered a Business Intelligence Pilot for contracting data analytics. CON-IT successfully supported two Air Force (AF) Pitch Days, resulting in more than 610 contracts and ~\$200M. Thus far in FY 2020, CON-IT is supporting more than 5,300 contracting specialists and COs, and has awarded more than 55,000 contracting actions. CON-IT successfully supported two AF Pitch Days, resulting in more than 350 contracts and ~\$28M.			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0901410F / <i>Contracting Information Technology System</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
<p>CON-IT's accomplishments have resulted in other Department of Defense and federal agencies seeking information about migrating to CON-IT as their contract writing and management solution. Some agencies have made requests to start the migration process.</p> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>-Update interagency agreement with USDA</li> <li>-Continue development and deployment activities for operational contracting capabilities</li> <li>-Begin deployment of Weapon Systems, Research &amp; Development, and Business Intelligence capabilities based on priorities of the program backlog</li> <li>-Continue planning for Logistics, Electronic Filing, and Governance capabilities based on priorities of the program backlog</li> <li>-Continue to mature agile and continuous integration/continuous delivery processes and assess long-term solution scalability &amp; hosting needs</li> <li>-Continue to plan future system development through an iterative process of sprint/release planning and backlog grooming amongst our stakeholder partners, which ensures that the capabilities developed meet our end users' needs and increases mission success.</li> </ul> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will update interagency agreement with USDA</li> <li>- Will continue development and final deployment activities for Weapon System, Research &amp; Development, and Business Intelligence capabilities based on priorities of the product backlog</li> <li>- Will continue planning for Logistics, Electronic Filing, and Governance capabilities based on priorities of the product backlog</li> <li>- Will continue to plan future system development through an iterative process of sprint/release planning and backlog grooming amongst our stakeholder partners, which ensures that the capabilities developed meet our end users' needs and increases mission success.</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased in line with program schedule and will ramp up in FY22 to complete remaining capabilities.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	16.998	20.830	8.662

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item #834010: <i>General Information Technology</i>	5.000	0.000	0.000	-	0.000	0.000	0.000	-	-	Continuing	Continuing

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0901410F / <i>Contracting Information Technology System</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**Remarks**

**E. Acquisition Strategy**

The interagency agreement between the CON-IT IPO and the United States Department of Agriculture is utilized to develop and deliver functional capability associated with the approved product backlog contained within the program's roadmap. This agreement is renewed each year and contains a high-level outline of the highest priority requirements and epics to be addressed during the timeframe of the agreement.

The CON-IT roadmap includes five major capabilities. Capability 1 modernizes contract writing for base-level and operational users, allowing the Air Force's Standard Procurement System and AFCENTs' O'Contrax to sunset as sites transition to CON-IT. Capability 2 deploys the same capability to meet the unique needs of the Weapon Systems, Research & Development, and Logistics communities, which will result in sunsetting ConWrite and Automated Contract Preparation System. Capability 3 and Capability 4 automate pre/post award activities for the unclassified user base from Capability 1 and Capability 2. Capability 5 implements Capability 1, Capability 2, Capability 3, and Capability 4 for classified users.

CON-IT is aligned to Office of the Secretary of Defense's (OSD's) Defense Procurement Acquisition Policy strategy for procurement systems. The program is re-engineering and automating the entire business process, implementing data standards set by OSD across the community, consolidating 10 legacy systems into one, reusing Government-off-the-Shelf solutions versus creating a new solution, and employing agile software development methods (a best practice from industry).

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0901410F / <i>Contracting Information Technology System</i>	<b>Project (Number/Name)</b> 643483 / <i>CON-IT</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CON IT: Prime Developer/ Systems Integrator	MIPR	Contracting Information : Wright Patterson AFB, OH	-	12.491	Oct 2018	15.487	Oct 2019	6.000	Oct 2020	-		6.000	Continuing	Continuing	-
<b>Subtotal</b>			-	12.491		15.487		6.000		-		6.000	Continuing	Continuing	N/A

**Remarks**  
Interagency agreement with USDA (United States Department of Agriculture)

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CON IT: Test and staging environment from USDA	MIPR	Various : Various	-	0.692	Oct 2018	0.922	Oct 2019	0.710	Oct 2020	-		0.710	Continuing	Continuing	-
<b>Subtotal</b>			-	0.692		0.922		0.710		-		0.710	Continuing	Continuing	N/A

**Remarks**  
USDA: United States Department of Agriculture

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CON-IT: Program Management Administration, Cost Estimating Support, Travel, Supplies, Equipment, Program Office Network	Various	AFLCMC/HIBB : WPAFB, OH	-	3.815	Oct 2018	4.421	Oct 2019	1.952	Oct 2020	-		1.952	Continuing	Continuing	-
<b>Subtotal</b>			-	3.815		4.421		1.952		-		1.952	Continuing	Continuing	N/A

**Remarks**  
A&AS: Advisory & Assistance Services



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0901410F / <i>Contracting Information Technology System</i>	<b>Project (Number/Name)</b> 643483 / <i>CON-IT</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>CON-IT Incremental Development Activities</b>																												
Agile Software Development of AF Contracting Domain Mission Set																												
Development, Test & Deployment Operational Contracting Capability																												
Development, Test & Deployment of Weapon Sys/R&D/Business Intel Capability																												
Development, Test & Deployment of Logistics Capability																												
Development, Test, & Deployment of Electronic Filing & Governance Capability																												
Development, Test & Deployment of Pre/Post Award Contracting Capability																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0901410F / <i>Contracting Information Technology System</i>	<b>Project (Number/Name)</b> 643483 / <i>CON-IT</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>CON-IT Incremental Development Activities</b>				
Agile Software Development of AF Contracting Domain Mission Set	1	2019	4	2025
Development, Test & Deployment Operational Contracting Capability	1	2019	4	2020
Development, Test & Deployment of Weapon Sys/R&D/Business Intel Capability	4	2020	4	2022
Development, Test & Deployment of Logistics Capability	1	2023	4	2023
Development, Test, & Deployment of Electronic Filing & Governance Capability	1	2024	4	2024
Development, Test & Deployment of Pre/Post Award Contracting Capability	1	2025	4	2025

**Note**

Development is forecasted to end in Q4 FY 2028.



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203164F / <i>NAVSTAR Global Positioning System (User Equipment) (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	1,039.190	236.786	320.598	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,596.574
643833: <i>MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP</i>	1,039.190	236.786	320.598	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,596.574
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 447

**A. Mission Description and Budget Item Justification**

Note: "NAVSTAR" will be removed from the program title in this Budget Line Item in the next budget submission.

In FY2021, PE 1203164F, NAVSTAR Global Positioning System (User Equipment) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1203164SF NAVSTAR Global Positioning System (User Equipment) from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

The Global Positioning System (GPS) is a space-based radio Positioning, Navigation, and Timing (PNT) distribution system. GPS User Equipment (UE) consists of standardized receivers, antennas, antenna electronics, and other related equipment, grouped together in sets to derive navigation and time information transmitted from GPS satellites. These receiver sets are used by the Department of Defense (DoD). Research, Development, Test and Evaluation (RDT&E) funds UE development, integration, test, and analysis for new PNT receiver capabilities in Navigation Warfare (NAVWAR) across all military platforms using GPS services.

The Military Global Positioning System User Equipment (MGUE) Increment (Inc) 1 program is responsible for the development of standard modernized receiver form factors for the Service-nominated lead platforms. The MGUE Inc 1 Capability Development Document (CDD) was approved by the Joint Requirements Oversight Council (JROC) on 24 July 2014. MGUE Inc 1 is initiating a new family of modernized GPS receivers that will deliver significantly improved capability to counter current and emerging PNT threats and enable military operations in a NAVWAR environment where current legacy receiver performance would be compromised. MGUE Inc 1 received a Milestone A decision in April 2012. The program received direction in February 2014 from the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) to execute a new acquisition strategy, accelerating the program to provide test units faster to facilitate military end users. The MGUE program received a Milestone B decision in January 2017.

The MGUE Inc 2 effort will continue to expand Military-Code (M-Code) receiver technology into additional applications (space receivers and precision guided munitions), and develop a modernized Handheld device to meet Service requirements. This effort leverages the MGUE Inc 1 technology to the maximum extent while addressing the production of M-Code integrated circuits far into the future. The MGUE Inc 2 program is being executed in three parts: 1) Risk Reduction Activities, 2) Miniature Serial Interface (MSI) Receiver Card Middle Tier Acquisition rapid prototyping, and 3) Joint Modernized GPS Handheld Receiver Middle Tier Acquisition rapid prototyping effort. The JROC approved the MGUE Inc 2 CDD on 6 April 2018. The Air Force Service Acquisition Executive approved the MGUE Inc 2 Acquisition

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)

Strategy to include designation of two Middle Tier Acquisition Rapid Prototype efforts: 1) Miniature Serial Interface (MSI) Receiver Cards to include next-generation Application Specific Integrated Circuit (ASIC) and 2) Joint, Modernized Handheld Receiver.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This Program Element (PE) may include necessary civilian pay expenses required to manage, execute, and deliver MGUE weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PEs 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	252.834	329.948	160.139	0.000	160.139
Current President's Budget	236.786	320.598	0.000	0.000	0.000
Total Adjustments	-16.048	-9.350	-160.139	0.000	-160.139
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-9.350			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-7.407	0.000			
• SBIR/STTR Transfer	-8.641	0.000			
• Other Adjustments	0.000	0.000	-160.139	0.000	-160.139

**Change Summary Explanation**

FY 2019: -\$7.407M for higher Air Force Space priorities.

FY 2020: -\$9.400M Congressional Directed Reduction - maintain program affordability, unjustified growth

FY 2021: -\$160.139M funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> MGUE Inc 1	76.474	53.506	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> The MGUE Inc 1 program develops standard modernized receiver form factors for the Service-nominated lead platforms in accordance with the MGUE Inc 1 CDD.</p> <p><b>FY 2020 Plans:</b> Continue the following: Verification Testing, Qualification Testing, Technical Requirements Verification, Lead Platform Integration, and Card level Program Executive Officer Certification for Operational Test and Evaluation (OT&amp;E). Continue to assist each lead platform office in integrating and testing M-Code receivers in their respective platforms. Continue M-Code ASIC producibility analysis, risk reduction, and early engineering. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>				
<p><b>Title:</b> Advanced Technology</p> <p><b>Description:</b> Advanced Technology includes efforts to mature technology for future GPS receivers called out in the MGUE CDDs. These efforts aim to find innovative solutions to increase resiliency in GPS performance and improve on size, weight, power, and cost (SWAP/C) of military receivers.</p> <p><b>FY 2020 Plans:</b> Continue developing new technologies to augment U.S. Military GPS receiver development. Deliver first formal release of the M-Code Government owned intellectual Property for incorporation into vendor solutions, opening the M-Code market to additional participants, including simulator developers and small businesses. Develop test plans and procedures, perform testing and deliver reports on the incorporation of advanced trust / integrity algorithms that might permit military use of other Global Navigation Satellite System signals for delivering assured PNT. Start the prototype development of an integrated antenna, Antenna Electronics and MGUE receiver suitable for protecting SWAP constrained platforms in a future NAVWAR environment. Identify and assess algorithms and hardware implementations for integration of enhanced anti jam capability for SWAP constrained MGUE handheld receiver.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>		13.885	5.097	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A				
<p><b>Title:</b> System/Platform Integration and Performance Certification</p> <p><b>Description:</b> Integration of MGUE Inc 1 receiver form factors into the Service-nominated lead platforms in support of developmental and operational test events. Conduct technical and operational modernization impact analysis for MGUE Service lead platform integration.</p> <p><b>FY 2020 Plans:</b> Continue developmental test of the ground-based lead platform efforts. Continue Host Application Equipment (HAE) and system level integration for the air/maritime based lead platform efforts in support of developmental test. Continue lead platform integration efforts in support of operational test events. Assist DoD integration of M-Code GPS receivers for Joint Service non-lead platforms.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>		49.445	61.396	0.000
<p><b>Title:</b> Information Assurance, Security/Compatibility Certification, and Test/Evaluation</p> <p><b>Description:</b> Develop, implement, and maintain GPS security certification programs. Development of DoD Policy, strategy and resource requirements for MGUE security certification and compatibility certification. Security certification, compatibility certification, and security approval ensures future military GPS receivers protect critical program information and continue working in all environments and concepts of operations called for by U.S. Strategic Command.</p> <p><b>FY 2020 Plans:</b> Continue to conduct security certification activities for all M-Code receivers, as required. Continue Modernized Security Evaluations/Tests for Selective Availability Anti-Spoofing Module (SAASM) and other legacy GPS receiver equipment. Review, approve, and track SAASM, M-Code receivers, and legacy receiver certified platforms and integrated applications for all of DoD. Continue to conduct delta certifications, as required. For the Ground Base-GPS Receiver Application Module-Military Code (GB-GRAM-M) complete the Technical Requirements Verification. Continue Requirements Verification and Reliability test activities as required to include approved engineering changes. Continue Lead Platform Integration test activities for the GB-GRAM-M MGUE vendors.</p> <p><b>FY 2021 Plans:</b></p>		5.830	13.194	0.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 1203164F I NAVSTAR Global Positioning System (User Equipment) (SPACE)
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Title:</b> MGUE Inc 2 Risk Reduction	91.152	187.405	0.000
<b>Description:</b> The MGUE Inc 2 program will develop M-Code receiver technology for additional applications (space receivers, precision guided munitions, and handheld receivers) to meet Service requirements. MGUE Inc 2 Risk Reduction activities include, but are not limited to, acquisition strategy development, early design efforts through Preliminary Design Review (PDR) for the next generation ASIC using 14nm ASIC technology node, handheld design activities and early user demonstrations, advanced concept studies, receiver component prototyping to include MGUE Inc 2 requirements.			
<b>FY 2020 Plans:</b> Continue development of next generation ASIC and receivers, continue Preliminary Design Review (PDR), and purchase core ASIC technology and ASIC design/manufacturing/test support. Commence security certification evaluations and refine plans. Award up to 3 development contract(s) for new low size/power receiver to include next generation ASIC post-PDR and integration activities. Continue M-Code Handheld risk reduction activities, to include prototype evaluations. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	236.786	320.598	0.000

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF 01 GPSSPC: Navstar GPS Space	2.181	0.000	-	-	-	-	-	-	-	0.000	2.181

**Remarks**  
Space Procurement, Air Force (SPAF) funding in this PE supports legacy SAASM efforts. Similar work for the MGUE is in the planning phase.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 1203164F I NAVSTAR Global Positioning System (User Equipment) (SPACE)
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**E. Acquisition Strategy**

The MGUE program has developed a comprehensive acquisition strategy to provide modernized GPS capabilities to U.S. and Allied Forces by developing a competitive market driven approach. This strategy establishes the signal compatibility and security criteria along with a process for evaluating components to enable rapid movement from development to fielding. The pillars of this effort are: (a) establishing time certain and low risk development; (b) bounding requirements to leverage mature technology to the maximum extent possible; (c) focusing on the development of form factors based on well-defined standards to support lead platform integration; and (d) implementing a proactive, collaborative MGUE platform integration activity to mitigate risk and reduce cost for DoD force structure modernization.

The MGUE program awarded three sole source contracts for the Inc 1 Technology Development Phase effort in September 2012, as follow-on efforts to the competitively awarded Modernized User Equipment (MUE) contracts awarded in June 2006. The effort spans the Technology Maturation and Risk Reduction Phase through design and includes integration and test of M-Code receivers into Service-nominated lead platforms. This effort also includes the security and compatibility certification of GPS receiver cards as a part of the integration effort. The Service lead platforms will select from the available vendors to integrate and perform operational testing with funding from the MGUE program. This supports compliance with PL 111-383, section 913.

The MGUE Inc 2 program developed an Acquisition Strategy to continue MGUE development by: addressing long term producibility of MGUE ASICs, identifying a U.S. owned trusted foundry for ASIC development, delivering GPS receiver cards to meet stringent Inc 2 requirements, and developing a modernized GPS handheld receiver to meet the needs of the Services. The MGUE Inc 2 program is being executed in three parts: 1) Risk Reduction Activities, 2) MSI Middle Tier Acquisition rapid prototyping, and 3) Joint Modernized GPS Handheld Receiver Middle Tier Acquisition rapid prototyping effort. The Air Force Service Acquisition Executive approved the MGUE Inc 2 Acquisition Strategy to include designation of two Middle Tier Acquisition Rapid Prototype efforts: 1) Miniature Serial Interface Receiver Card (includes next-generation ASIC) and 2) Joint, Modernized Handheld Receiver.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Air Force</b>											<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 3600 / 4				<b>R-1 Program Element (Number/Name)</b> PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)					<b>Project (Number/Name)</b> 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP						

<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
MGUE Inc 1 Technology Development	C/CPIF	Collins Aerospace : Cedar Rapids, IA	136.120	9.430	Nov 2018	12.584	Nov 2019	0.000		-		0.000	0.000	158.134	167.971
MGUE Inc 1 Technology Development (1)	C/CPIF	Raytheon : El Segundo, CA	179.113	15.678	Nov 2018	8.685	Nov 2019	0.000		-		0.000	0.000	203.476	211.320
MGUE Inc 1 Technology Development (2)	C/CPIF	L3Harris Tech : Anaheim, CA	96.635	10.687	Nov 2018	5.364	Nov 2019	0.000		-		0.000	0.000	112.686	120.189
MGUE Inc 1 Pre-Tech Development	C/CPAF	Various : Various	46.929	13.885	Jan 2019	5.097	Jan 2020	0.000		-		0.000	0.000	65.911	-
MGUE Inc 1 Demos	C/CPAF	Various : TBD	19.783	-		-		-		-		-	0.000	19.783	-
MGUE Inc 1 Platform Integration	C/CPAF	Various : Various	169.584	26.980	Nov 2018	45.326	Nov 2019	0.000		-		0.000	0.000	241.890	-
MGUE Inc 1 Compatibility Certification	C/CPAF	Various : Various	11.158	-		-		-		-		-	0.000	11.158	-
MGUE Inc 1 Information Assurance	C/CPAF	Various : Various	20.669	2.548	Jan 2019	2.706	Jan 2020	0.000		-		0.000	0.000	25.923	-
MGUE Inc 1 Security Certification	C/CPAF	Various : Various	31.374	1.539	Jan 2019	1.756	Jan 2020	0.000		-		0.000	0.000	34.669	-
MGUE Inc 1 Technical Mission Analysis	MIPR	Various : El Segundo, CA	41.756	18.231	Oct 2018	16.352	Oct 2019	0.000		-		0.000	0.000	76.339	-
MGUE Inc 1 Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	60.557	22.467	Nov 2018	16.070	Nov 2019	0.000		-		0.000	0.000	99.094	132.525
MGUE Inc 2 Risk Reduction	Various	Various : Various	108.400	86.760	Jan 2019	164.155	Jan 2020	0.000		-		0.000	0.000	359.315	1,013.400
MGUE Inc 2 Technical Mission Analysis	MIPR	Various : El Segundo, CA	2.510	0.000		4.100	Oct 2019	0.000		-		0.000	0.000	6.610	-
MGUE Inc 2 Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	2.020	1.101	Jan 2019	11.200	Nov 2019	0.000		-		0.000	0.000	14.321	97.300
<b>Subtotal</b>			926.608	209.306		293.395		0.000		-		0.000	0.000	1,429.309	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)	<b>Project (Number/Name)</b> 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MGUE Inc 1 Test and Evaluation	Various	Various : San Diego, CA	17.851	1.742	Jan 2019	8.732	Jan 2020	0.000		-		0.000	0.000	28.325	-
<b>Subtotal</b>			17.851	1.742		8.732		0.000		-		0.000	0.000	28.325	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MGUE Inc 1 FFRDC	Various	Aerospace/MITRE : Various	51.790	5.597	Dec 2018	5.929	Dec 2019	0.000		-		0.000	0.000	63.316	-
MGUE Inc 2 FFRDC	Various	Aerospace/MITRE : Various	2.500	0.000	Dec 2018	2.600	Dec 2019	0.000		-		0.000	0.000	5.100	-
MGUE Inc 1 A&AS	Various	Various : Various	37.430	16.423	Dec 2018	4.163	Dec 2019	0.000		-		0.000	0.000	58.016	-
MGUE Inc 2 A&AS	Various	Various : Various	1.400	3.291	Dec 2018	5.350	Dec 2019	0.000		-		0.000	0.000	10.041	-
MGUE Inc 1 and Inc 2 Other Support	Various	Various : Various	1.611	0.427	Dec 2018	0.429	Dec 2019	0.000		-		0.000	0.000	2.467	-
<b>Subtotal</b>			94.731	25.738		18.471		0.000		-		0.000	0.000	138.940	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		1,039.190	236.786	320.598	0.000	-	0.000	1,596.574	N/A

**Remarks**  
MGUE Inc 2 Risk Reduction (\$164.115M) previously consolidated FY20 ASIC (\$139.115M), MSI (\$15.4M) Handheld(\$9.6M). There is no cost change in FY20.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)	<b>Project (Number/Name)</b> 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>MGUE Increment 1</b>																												
MGUE Inc 1 Security Certification																												
MGUE Inc 1 Developmental Test*																												
<b>MGUE Increment 2</b>																												
MGUE Inc 2 Next-Gen ASIC Studies up to PDR																												
MGUE Inc 2 Handheld Risk Reduction Activities/Prototypes																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)	<b>Project (Number/Name)</b> 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>MGUE Increment 1</b>				
MGUE Inc 1 Security Certification	1	2019	2	2019
MGUE Inc 1 Developmental Test*	1	2019	4	2020
<b>MGUE Increment 2</b>				
MGUE Inc 2 Next-Gen ASIC Studies up to PDR	1	2019	4	2020
MGUE Inc 2 Handheld Risk Reduction Activities/Prototypes	3	2019	4	2020

**Note**

All 5 form factors will go through some form of Developmental Test. Per the MGUE Inc 1 Acq Strategy however, only the first card of each variant (GB-GRAM-M/GRAM-S/M) will go through formal Operational Test. OT could/would complete on the "first card" while other form factors continue to go through DT.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					<b>R-1 Program Element (Number/Name)</b> PE 1203710F / <i>EO/IR Weather Systems</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	7.786	125.964	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
643730: <i>EO/IR Weather System Dev</i>	-	7.786	125.964	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1203710F, EO/IR Weather Systems efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1203710SF, EO/IR Weather Systems from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

In compliance with 2016 National Defense Authorization Act (NDAA) and Joint Requirements Oversight Council (JROC) Memo 062-17, dated 20 Jun 2017, the Air Force has decided to pursue a materiel solution to address Space-based Environmental Monitoring (SBEM) weather Gap 1 - Cloud Characterization (CC) and Gap 2 - Theater Weather Imagery (TWI) as a follow-on to Defense Meteorological Satellite Program (DMSP) operational constellation. The Department of Defense (DoD) requires continued global collection of CC and TWI data to contribute to the space domain awareness. Without the CC and TWI data, AF production of global predictive weather data would be severely impacted, affecting daily air operations and intelligence gathering for strategic mission planning, especially around the contested environment. Electro-Optical/Infrared (EO/IR) Weather Systems (EWS) is a component of JROC-approved SBEM materiel solution specifically designed to address CC and TWI needs post-DMSP mission end of life.

Based on recently completed SBEM Capability Assessment and Strategy Review (CASR) in April 2019, the current EWS acquisition strategy pivots focuses on a distributed LEO architecture, for scalability and increased operational resilience. The Air Force will pursue prototyping of latest industry capabilities for simplified sensor designs, while meeting CC and TWI requirements and data latencies in a distributed architecture. The EWS prototyping effort will:

- 1) Explore low-Size, Weight & Power/simplified EO/IR sensor designs in highly competitive design sprints, utilizing variety of experimental/prototyping contract vehicles
- 2) Conduct system technology end-to-end demonstration, from prototype build, Integration & Test, Launch, ground Telemetry/Tracking & Commanding (TT&C) and on-orbit data collection to data processing and dissemination to the Weather Centrals
- 3) Explore business models for the feasibility of commercially available data

In addition, the program may integrate sensors into a commercial & Government communication transport layer, leveraging web services to ensure delivery of data products to end users.

Secondary investments may be supported to address weather gaps identified in the SBEM Analysis of Alternatives and validated by the JROC.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203710F / <i>EO/IR Weather Systems</i>
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Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver EWS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	7.940	101.222	156.819	0.000	156.819
Current President's Budget	7.786	125.964	0.000	0.000	0.000
Total Adjustments	-0.154	24.742	-156.819	0.000	-156.819
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	24.742			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.154	0.000			
• Other Adjustments	0.000	0.000	-156.819	0.000	-156.819

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 643730: *EO/IR Weather System Dev*

Congressional Add: *Transfer from SpRCO (Line 72)*

Congressional Add Subtotals for Project: 643730

Congressional Add Totals for all Projects

	FY 2019	FY 2020
Congressional Add Subtotals for Project: 643730	-	24.742
Congressional Add Totals for all Projects	-	24.742

**Change Summary Explanation**

FY 2020: +24.742M: Congressional add for transfer from line 72 (SpRCO)

FY 2021: -\$156.819M: funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203710F / <i>EO/IR Weather Systems</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Electro-Optical/Infrared Weather System (EWS)</p> <p><b>Description:</b> Description: EWS will pursue multi-phase efforts utilizing rapid experimental/prototype contract vehicles to mature industry EO/IR technologies to provide global LEO coverage to meet SBEM Gaps 1 (CC) and 2 (TWI) and eventual on-ramp to operational EO/IR system to replace DMSP constellation. Space Enterprise Consortium (SpEC) Other Transaction (OT) #1 is the prototyping effort, which will focus on maturing multi-spectral imaging capabilities to collect &amp; disseminate terrestrial atmospheric phenomena to support DoD operations, while assessing industrial capabilities to provide CC and TWI data in a viable commercial business model. The program will pursue simplified sensor designs and corresponding lower size, weight and power prototypes potentially hosted on a proliferated LEO mesh network. To minimize risks associated with rapid prototyping effort to replace DMSP constellation, SpEC OT #2 will focus on further developing high maturity EO/IR system designs in competitive design sprints in a parallel path to SpEC OT #1. This path will provide viable on-ramp opportunity to field operational EO/IR system, should prototype demonstrations prove unsuccessful.</p> <p><b>FY 2020 Plans:</b> For EWS Phase II, award up to three prototype contracts under SpEC OT #1 for rapid design sprints, while exploring viability of commercial weather data service business model. Award up to two vendors for SpEC OT #2 risk mitigation system design effort. Conduct prototype interim design reviews and downselect prototype vendor for prototype system build. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	7.786	101.222	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	7.786	101.222	0.000

	<b>FY 2019</b>	<b>FY 2020</b>
<b>Congressional Add:</b> Transfer from SpRCO (Line 72)	-	24.742
<b>FY 2020 Plans:</b> Transfer from Line 72 for EO/IR prototyping effort		
<b>Congressional Adds Subtotals</b>	-	24.742

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203710F / <i>EO/IR Weather Systems</i>
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**D. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• SPAF 01 SPCMOD: <i>Space Mods</i>	49.526	-	-	-	-	-	-	-	-	0.000	49.526

**Remarks**

Reflects PE 1203710F EO/IR Weather Systems portion of shared P-1 line SPCMOD.

**E. Acquisition Strategy**

The acquisition strategy for EWS is based on validated SBEM CASR recommendations, JROC Memoranda, and subsequent architectural analysis for future weather needs. EWS will initially pursue competitive bids to field technology demonstration EO/IR prototype system capable of fulfilling CC and TWI. Once technology demonstrations of the prototype system has proven successful, the EWS program will transition to fielding operational systems capable of meeting CC and TWI requirements.

Phase I will leverage ongoing experimental EO/IR prototype development projects under AFRL's SBIR contracts to understand operational utility of available and developing EO/IR sensors.

Phase II SpEC OT #1 will involve competitive bids for multiple system designs using SpEC OT contracts for rapid prototyping effort to fulfill CC and TWI requirements, while exploring valid commercial business models for industry to provide weather data as a service.

In order to minimize risks to DMSP constellation coverage, the Air Force will also pursue SpEC OT #2 for risk mitigation, pursuing competitive bid on low- risk, high-maturity system-level solutions in a parallel effort to the prototyping effort, that can fully address CC and TWI requirements as part of the Family of Systems comprised of civil and International partnerships. This risk mitigation option will carry two vendors to PDR level design and include assessment of prototype system performance and potential for transition to operations.

Following the acquisition strategy approval and assessment of the simplified sensors' performance with the AF weather mission, the AF plans to assess costs to ramp production in future phase III to reduce revisit time to maximize warfighter utility.



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1203710F / <i>EO/IR Weather Systems</i>	<b>Project (Number/Name)</b> 643730 / <i>EO/IR Weather System Dev</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>EO/IR Weather Systems (EWS)</i></b>	
EWS Phase II Spec OT #1 System Prototype Solicitation Dev & Award	██████████
EWS Phase II SpEC OT #1 System Prototype Design	██████████



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1203710F / <i>EO/IR Weather Systems</i>	<b>Project (Number/Name)</b> 643730 / <i>EO/IR Weather System Dev</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>EO/IR Weather Systems (EWS)</i></b>				
EWS Phase II Spec OT #1 System Prototype Solicitation Dev & Award	3	2019	2	2020
EWS Phase II SpEC OT #1 System Prototype Design	2	2020	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206422F / <i>Weather System Follow-on</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	369.269	128.600	205.660	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	703.529
644289: <i>Weather System Follow-On</i>	369.269	128.600	205.660	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	703.529

**Program MDAP/MAIS Code:** 488

**A. Mission Description and Budget Item Justification**

In FY2021, PE 1206422F, Weather System Follow-On efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206422SF Weather System Follow-On from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

Based on completion of the Space-Based Environmental Monitoring (SBEM) Joint Requirements Oversight Council (JROC) Memo 092-14, capabilities will be developed to satisfy weather gaps for which no known mitigation exists. Weather System Follow-on (WSF) is a component of SBEM efforts to develop capabilities to satisfy weather Gap 3 Ocean Surface Vector Winds (OSVW), Gap 8 Tropical Cyclone Intensity (TCI), and Gap 11 Low Earth Orbit (LEO) Energetic Charged Particles (LEO ECP). Gap 3 OSVW and Gap 8 TCI require a space-based microwave sensor to provide polarimetric ocean surface wind direction and speed required for naval sea operations, as well as fighter sortie generations and marine amphibious operations. Gap 11 LEO ECP requires in situ ECP sensor for space situational awareness. The earliest possible launch options are being integrated in the design for critical gaps.

DoD established WSF as a Pre-Major Defense Acquisition Program (MDAP) with the Air force as the lead component. Based on the SBEM AoA results, the WSF initial thrusts will be to enable:

- 1) DoD use of data collected by civil, international and other DoD space systems;
- 2) Timely weather collection over broad oceans in support of maneuvering forces;
- 3) Space weather capabilities to characterize operational orbits, space situational awareness, and the ionosphere.

Secondary investments may be supported to address weather gaps identified in the SBEM AoA and validated by the JROC.

The Military Application of the Space Environment (MASE) is a program to demonstrate mature space environment technology to improve combat operations. MASE will enhance regional ionospheric specification (nowcasts) and predictions (forecasts) affecting signal propagation paths. MASE uses traditional and non-traditional ionospheric measurements in advanced space environment models to forecast and predict impacts to weapon systems. Contributes to satisfying Gaps 4 and 7 of the SBEM AoA results as supplemented by the AFRDM 02-17-02 (SBEM JDCR). MASE was a new start in FY 2019.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206422F / <i>Weather System Follow-on</i>
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managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver WSF weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	138.052	225.660	54.748	0.000	54.748
Current President's Budget	128.600	205.660	0.000	0.000	0.000
Total Adjustments	-9.452	-20.000	-54.748	0.000	-54.748
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-20.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-4.905	0.000			
• SBIR/STTR Transfer	-4.547	0.000			
• Other Adjustments	0.000	0.000	-54.748	0.000	-54.748

**Change Summary Explanation**

FY 2019: -\$4.547M SBIR transfer; -\$4.905M transferred for higher AF priorities.

FY 2020: -\$20.000M Congressional Directed Reduction for unjustified growth.

FY 2021: -\$54.748M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4					<b>R-1 Program Element (Number/Name)</b> PE 1206422F / <i>Weather System Follow-on</i>				<b>Project (Number/Name)</b> 644289 / <i>Weather System Follow-On</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
644289: <i>Weather System Follow-On</i>	369.269	128.600	205.660	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	703.529
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	

**A. Mission Description and Budget Item Justification**

Based on completion of the Space-Based Environmental Monitoring (SBEM) Joint Requirements Oversight Council (JROC) Memo 092-14, capabilities will be developed to satisfy weather gaps for which no known mitigation exists. Weather System Follow-on (WSF) is a component of SBEM efforts to develop capabilities to satisfy weather Gap 3 Ocean Surface Vector Winds (OSVW), Gap 8 Tropical Cyclone Intensity (TCI), and Gap 11 Low Earth Orbit (LEO) Energetic Charged Particles (LEO ECP). Gap 3 OSVW and Gap 8 TCI require a space-based microwave sensor to provide polarimetric ocean surface wind direction and speed required for naval sea operations, as well as fighter sortie generations and marine amphibious operations. Gap 11 LEO ECP requires in situ ECP sensor for space situational awareness. The earliest possible launch options are being integrated in the design for critical gaps.

DoD established WSF as a Pre-Major Defense Acquisition Program (MDAP) with the Air force as the lead component. Based on the SBEM AoA results, the WSF initial thrusts will be to enable:

- 1) DoD use of data collected by civil, international and other DoD space systems;
- 2) Timely weather collection over broad oceans in support of maneuvering forces;
- 3) Space weather capabilities to characterize operational orbits, space situational awareness, and the ionosphere.

Secondary investments may be supported to address weather gaps identified in the SBEM AoA and validated by the JROC.

The Military Application of the Space Environment (MASE) is a program to demonstrate mature space environment technology to improve combat operations. MASE will enhance regional ionospheric specification (nowcasts) and predictions (forecasts) affecting signal propagation paths. MASE uses traditional and non-traditional ionospheric measurements in advanced space environment models to forecast and predict impacts to weapon systems. Contributes to satisfying Gaps 4 and 7 of the SBEM AoA results as supplemented by the AFRDM 02-17-02 (SBEM JDCR). MASE was a new start in FY 2019.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver WSF weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206422F / <i>Weather System Follow-on</i>	<b>Project (Number/Name)</b> 644289 / <i>Weather System Follow-On</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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<p><b>Title:</b> WSF Microwave Satellite (SV1-2)</p> <p><b>Description:</b> WSF Microwave Satellite (SV1-2): The Air Force awarded a contract to Ball Aerospace and Technologies Corp. to develop the WSF - Microwave (WSF-M) Space Vehicle (SV) to meet all three capability gaps. WSF-M SV-2 will be an option to exercise, should AF wish to replenish WSF constellation post-SV-1. SV-2 will be functionally equivalent to SV-1. The WSF-M SV-1 projected Initial Launch Capability (ILC) is FY 2024. Secondary investments may be supported to address weather gaps identified in the SBEM AoA and validated by the JROC.</p> <p><b>FY 2020 Plans:</b> Complete WSF-M System CDR and continue ground SV-1 development to include purchase of long lead items and spares. Plan for robust spares purchase for SV-1 could potentially support future SV-2 fabrication, should the option be exercised. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	97.513	189.954	0.000
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<p><b>Title:</b> COWVR Tech Demo</p> <p><b>Description:</b> The Compact Ocean Surface Wind Vector Radiometer (COWVR) launch objective supports Category A Weather Requirements, as codified in JROC Memo 092-014, providing on-orbit technology demonstration of the new COWVR technology to deliver Weather Gap #3, Ocean Surface Vector Winds (OSVW) and Gap #8, Tropical Cyclone Intensity (TCI). This will be a cooperative mission with NASA for integrating the sensor onto the International Space Station (ISS) as a weather technology demonstration project. The new mission designation for the COWVR launch will be Space Test Program Houston Mission #8 (STP-H8). Demonstrating COWVR technology in the space environment remains an important milestone for the microwave data weather mission in lieu of the ORS-6 cancellation. Unlike ORS-6, COVWR will fly on the ISS and the residual operational capability is not guaranteed as a result. Due to this restructure, the projected COWVR launch will be delayed from FY 2019 to FY 2021.</p> <p><b>FY 2020 Plans:</b></p>	5.230	14.376	0.000
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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206422F / <i>Weather System Follow-on</i>	<b>Project (Number/Name)</b> 644289 / <i>Weather System Follow-On</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Integration &amp; Test (I&amp;T) for COWVR/ISS; Environmental Tests; Phase 3 NASA Safety review; continued development of COWVR ground processing software; Turnover to NASA. This funding includes but is not limited to payload interface unit, associated electronics, integration, system and environmental testing, launch, and ground operations establishment.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>				
<p><b>Title:</b> ECP</p> <p><b>Description:</b> Energetic Charged Particles (ECP) will fulfill the Space-based Environmental Monitoring (SBEM) Weather Gap 11 and address the Secretary of the Air Force (SECAF) policy which directs each USAF Satellite Office to plan for and integrate ECP sensors on all pre-Milestone B new satellite acquisitions. To accomplish this requirement, the ECP sensor will be integrated on the WSF-M satellite.</p> <p>Energetic Charged Particle (ECP) Hazard Assessment System (HAS) will be a component of space attack assessment. A commercial sources for Aerospace's ECP-Lite sensor and AFRL's CEASE3 has been established. The ECP sensors will be hosted on international and commercial missions to gain additional flight opportunities, orbital regimes, relationships, and constellation architectures to augment the ECP HAS system with supplemental data.</p> <p><b>FY 2020 Plans:</b> Continue testing and storage of the ECP sensor for WSF before delivery to prime contractor.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>		9.621	1.330	0.000
<p><b>Title:</b> Military Application of the Space Environment (MASE)</p> <p><b>Description:</b> MASE demonstrates a sensor-to-shooter solution to improve mission effectiveness by providing commanders an operational risk assessment tool. MASE will deliver a capability comprised of weapon system tailored visualizations/decision aids to allow warfighter integration into operational plans and tactics, techniques, and procedures. MASE products and services will be evaluated using quantitative standard measures of performance, effectiveness, and outcome against theater operational requirements.</p> <p><b>FY 2020 Plans:</b></p>		16.236	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206422F / <i>Weather System Follow-on</i>	<b>Project (Number/Name)</b> 644289 / <i>Weather System Follow-On</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
N/A			
<b><i>FY 2021 Plans:</i></b> N/A			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	128.600	205.660	0.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

DoD established WSF as a pre-MDAP. The acquisition strategy for WSF is based on validated SBEM AoA results from FY2014 and subsequent acquisition strategy development activities that were conducted in FY 2015. The WSF acquisition strategy focuses on streamlined acquisition process for providing materiel solutions to OSVW, TCI & LEO ECP, as validated by the JROC; deliver microwave sensing solution to address DoD needs for OSVW and TCI capabilities and deliver space environment sensing solution to address LEO ECP capabilities for on-orbit attributions and anomaly resolutions.

The Air Force is conducting a technology demonstration of the Compact Ocean Surface Wind Vector Radiometer (COWVR) sensor in partnership with NASA Space Test Program (STP) to launch and integrate with International Space Station (ISS), utilizing their unique technology demonstration capabilities for on-orbit demonstration of COWVR technology. SMC's STP is the leading AF organization spearheading the NASA partnership, while SMC/DCIF is responsible for the COWVR project and funding and providing programmatic support to enable COWVR sensor to ISS integration/technology demonstration.

The program awarded a contract for WSF satellite, capable of meeting all three weather capability gaps, in a full and open competition environment, in order to reduce overall program cost. The Air Force is procuring one WSF-M satellite with an option for a second satellite. WSF-M first satellite (SV-1) ILC is FY 2024 to mitigate any potential weather coverage gaps. WSF-M SV-2 ILC is currently projected for FY 2028. The WSF SV-2 will be functionally equivalent to SV-1. Naval Research Lab Blossom Point Tracking Facility (BPTF) will be used as a viable unclassified EGS-compatible SOC for WSF-M. BPTF consists of a satellite mission operations center, multiple ground antennas including via AFSCN, and an existing infrastructure capable of providing space system command, control, and communications (C3).

The WSF ECP sensor development will leverage current AFRL sensor and hazard assessment technology to accelerate availability of ECP sensor for integration on WSF-M and other planned AF satellite acquisitions. The AF intends to transition AFRL's technology to industry for production via competitive award. Two Tech Demo ECP sensors are projected to be delivered and ready for satellite integration by FY 2022. Post-Tech Demo ECP phase, each respective program offices will be responsible for the procurement/integration and sustainment of the sensors required to meet the SecAF's Space Situational Awareness (SSA) policy.



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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>	<b>Project (Number/Name)</b>
3600 / 4	PE 1206422F / <i>Weather System Follow-on</i>	644289 / <i>Weather System Follow-On</i>

The program intends to continue research and development at AFRL to support the MASE baseline. Features to enhance and improve MASE related prototypes/models will be added through capability drops while maintaining Risk Management Framework compliance. Award contracts to conduct studies and perform technical analysis for external data sources and optimal sensor laydown, system development and external system integration. Conduct field campaigns to validate scientific algorithms. Provision cloud services, deploy ionospheric ground sensors and provide program office support.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206422F / <i>Weather System Follow-on</i>	<b>Project (Number/Name)</b> 644289 / <i>Weather System Follow-On</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
COWVR Technology Demonstration	Various	Various : Various	53.902	5.230	Apr 2019	14.376	Apr 2020	0.000		-		0.000	0.000	73.508	-
WSF Microwave System (SV1-2)	C/FFP	Ball Aerospace : Boulder, CO	114.338	67.099	Nov 2018	162.674	Nov 2019	0.000		-		0.000	0.000	344.111	-
ECP	Various	Various : Various, NM	5.673	0.521	Jan 2019	1.330	Jan 2020	0.000		-		0.000	0.000	7.524	-
ECP Prototyping	Various	Various : El Segundo, CA	0.000	9.100		0.000		0.000		-		0.000	0.000	9.100	-
MASE	Various	Various : Various, CO	0.000	16.236	Dec 2018	0.000		0.000		-		0.000	0.000	16.236	-
Enterprise Systems Engineering & Integration	C/CPIF	Engility Corp. : Andover, MA	4.340	4.794	Nov 2018	3.506	Nov 2019	0.000		-		0.000	0.000	12.640	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	10.834	5.649	Oct 2018	5.789	Oct 2019	0.000		-		0.000	0.000	22.272	-
Weather Studies (Formerly BAA)	Various	Various : Various, CA	6.489	0.000		0.000		0.000		-		0.000	0.000	6.489	-
Ground	MIPR	NRL : Welcome, MD	1.670	4.014	Dec 2018	5.734	Dec 2019	0.000		-		0.000	0.000	11.418	-
Pre-Acquisition Activities	Various	Various : Various	121.704	0.000		0.000		0.000		-		0.000	0.000	121.704	-
<b>Subtotal</b>			318.950	112.643		193.409		0.000		-		0.000	0.000	625.002	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Requirements/Engineering Analysis Support	RO	Defense Information Technical Center : El Segundo, CA	1.543	-		-		-		-		-	0.000	1.543	-
Engineering Risk Reduction Studies	Various	Various : Various	1.711	-		-		-		-		-	0.000	1.711	-
<b>Subtotal</b>			3.254	-		-		-		-		-	0.000	3.254	N/A



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**Exhibit R-4, RDT&E Schedule Profile:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206422F / <i>Weather System Follow-on</i>	<b>Project (Number/Name)</b> 644289 / <i>Weather System Follow-On</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
<b><i>Weather System Follow-On</i></b>																												
COWVR Technology Demonstration Kickoff	■																											
COWVR Technology Demonstration PDR		■																										
COWVR Technology Demonstration CDR				■																								
COWVR Technology Demonstration I&T					■	■	■	■																				
WSF Microwave System Preliminary Design Review	■																											
WSF Microwave Ground CDR					■																							
WSF Microwave System Milestone B						■	■	■																				
WSF SV-1 Production						■	■	■	■																			
WSF Microwave System CDR						■																						
WSF ECP Delta CDR						■																						
WSF Microwave Imaging Integration and Test							■	■	■																			
WSF Microwave Ground Segment Development									■																			
<b><i>MASE</i></b>																												
MASE Award Contracts	■																											
MASE Capability Drops		■	■	■																								
MASE Leave Behind Capability		■	■	■																								
<b><i>SMC/AD ECP ATP</i></b>																												
AD ECP Contract Award		■																										

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206422F / <i>Weather System Follow-on</i>	<b>Project (Number/Name)</b> 644289 / <i>Weather System Follow-On</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Weather System Follow-On</i></b>				
COWVR Technology Demonstration Kickoff	1	2019	1	2019
COWVR Technology Demonstration PDR	2	2019	2	2019
COWVR Technology Demonstration CDR	4	2019	4	2019
COWVR Technology Demonstration I&T	2	2020	4	2020
WSF Microwave System Preliminary Design Review	1	2019	1	2019
WSF Microwave Ground CDR	1	2020	1	2020
WSF Microwave System Milestone B	2	2020	2	2020
WSF SV-1 Production	2	2020	4	2020
WSF Microwave System CDR	2	2020	2	2020
WSF ECP Delta CDR	2	2020	2	2020
WSF Microwave Imaging Integration and Test	3	2020	4	2020
WSF Microwave Ground Segment Development	4	2020	4	2020
<b><i>MASE</i></b>				
MASE Award Contracts	1	2019	1	2019
MASE Capability Drops	2	2019	4	2019
MASE Leave Behind Capability	2	2019	4	2019
<b><i>SMC/AD ECP ATP</i></b>				
AD ECP Contract Award	2	2019	2	2019

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206425F / <i>Space Situation Awareness Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	32.351	29.776	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
640290: <i>Deep Space Advanced Radar Concept</i>	-	32.351	29.776	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206425F, Deep Space Advanced Radar Concept efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206425SF Deep Space Advanced Radar Concept from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

Deep Space Advanced Radar Concept (DARC) will leverage ongoing defense science and technology efforts to mature radar concepts and technologies to develop and evaluate prototypes that demonstrate increased sensitivity, capacity, search rates, and scalability to detect, track and maintain custody of objects in deep space orbit. This effort will analyze and select the most promising technologies to move forward into system development and operations and a program of record (PoR). DARC will augment the Space Surveillance Network (SSN) as an additional sensor with increased capacity and capability for deep space object custody at Geosynchronous Earth Orbit (GEO).

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 1206425F / Space Situation Awareness Systems
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	33.469	29.776	33.370	0.000	33.370
Current President's Budget	32.351	29.776	0.000	0.000	0.000
Total Adjustments	-1.118	0.000	-33.370	0.000	-33.370
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.118	0.000			
• Other Adjustments	0.000	0.000	-33.370	0.000	-33.370

**Change Summary Explanation**

FY 2021: -\$33.3704M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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<b>Title:</b> DARC Technology Maturation and Prototype Development	32.351	0.000	0.000
<b>Description:</b> Deep Space Advanced Radar Concept (DARC) will leverage ongoing defense science and technology efforts to mature radar concepts and technologies to develop and evaluate prototypes that demonstrate increased sensitivity, capacity, search rates, and scalability to detect, track and maintain custody of objects in deep space orbit. This effort will analyze and select the most promising technologies to move forward into system development and operations and a PoR.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Title:</b> DARC Site 1 Operational Capability	0.000	29.776	0.000
<b>Description:</b> The Deep Space Advance Radar Capability Middle Tier Acquisition (MTA) activity will use knowledge gained through the Deep Space Advanced Radar Concept technology demonstration to identify system specifications and a Government Reference Architecture (GRA). The specification and GRA will then support a competition for a global Deep Space Capability			



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206425F / <i>Space Situation Awareness Systems</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>system. This MTA activity will use market research and a Government Reference Architecture developed previously to provide the knowledge to determine the acquisition approach through further prototyping and/or rapid acquisition.</p> <p>The MTA activity will develop, test, and deliver three radar sites located strategically around the world to provide a global Deep Space Radar Capability to support Space Situational Awareness (SSA). The system will be responsive to regularly scheduled and un-scheduled tasks to locate, identify, characterize deep space objects and report the results to the SSN and Battle Management Command and Control locations.</p> <p>Leverage ongoing DARC Technology Maturation and Prototype Development efforts and defense science and technology efforts to initiate PoR for the DARC global radar capability. Supports standup of the DARC program office, award of contract for the DARC global radar capability, and completion of the engineering, manufacturing, and development of the first site through Critical Design Review (CDR).</p> <p><b>FY 2020 Plans:</b> Prepare for Request for Proposal (RFP) for DARC PoR to develop and deploy the DARC global radar capability. Investigate and conduct activities to reduce risk for the DARC program. Rapidly respond to and implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	32.351	29.776	0.000

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
Project utilizes existing DoD engineering and study contracts and activities to conduct science and technology development and data analysis activities. Preliminary/critical design effort for the technology maturation and prototype commenced in FY 2017. A Broad Agency Announcement (BAA) was used to award seven Integrated System Engineering Team (ISET) contracts which allow for organizations to participate, advise the government, and gain insight into the prototype design and build. In May of 2019 DARC was designated as an Middle Tier Acquisition under Section 804 of the 2016 National Defense Authorization Act (NDAA). DARC PoR will be a full

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	PE 1206425F / <i>Space Situation Awareness Systems</i>

and open industry competition combining both University Affiliated Research Centers (UARC) and industry. The PoR will consist of three global, incrementally fielded, and simultaneously constructed sites during the years FY 2023 through FY 2025.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206425F / <i>Space Situation Awareness Systems</i>	<b>Project (Number/Name)</b> 640290 / <i>Deep Space Advanced Radar Concept</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DARC Concept Definition, Prototype Development and Analysis	SS/CPAF	JHL-APL : Laurel, MD	-	24.946	Apr 2019	-		0.000		-		0.000	0.000	24.946	-
DARC Site 1 Capability	TBD	TBD : TBD	-	-		17.773	Jul 2020	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	24.946		17.773		0.000		-		0.000	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Prototype System and Sustainment Analyses	PO	AFRL : Albuquerque, NM	-	3.000	Jan 2019	0.010	Jan 2020	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	3.000		0.010		0.000		-		0.000	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS	Various	Various : Various	-	1.200	Dec 2018	5.350	Jul 2020	0.000		-		0.000	Continuing	Continuing	-
FFRDC	SS/FP	MITRE Corp : Colorado Springs, CO	-	3.155	Oct 2018	6.100	Jul 2020	0.000		-		0.000	Continuing	Continuing	-
Other Support	Various	Various : Colorado Springs, CO	-	0.050	Oct 2018	0.543	Jul 2020	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	4.405		11.993		0.000		-		0.000	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	32.351	29.776	0.000	-	0.000	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206425F / <i>Space Situation Awareness Systems</i>	<b>Project (Number/Name)</b> 640290 / <i>Deep Space Advanced Radar Concept</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025						
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4			
<b>DARC</b>																															
Prototype Build and Test																															
Operational Demonstrations																															
MTA Designation																															
Program of Record Stand Up																															
Develop Documentation and Request for Proposal																															

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206425F / <i>Space Situation Awareness Systems</i>	<b>Project (Number/Name)</b> 640290 / <i>Deep Space Advanced Radar Concept</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>DARC</b>				
Prototype Build and Test	1	2019	4	2020
Operational Demonstrations	4	2020	4	2020
MTA Designation	3	2019	3	2019
Program of Record Stand Up	3	2019	4	2019
Develop Documentation and Request for Proposal	1	2020	4	2020

**Note**  
DARC Site 1 estimated completion date and Initial Operating Capability (IOC) is FY 2025.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>					<b>R-1 Program Element (Number/Name)</b>							
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	0.000	142.045	8.787	0.000	8.787	0.000	0.000	0.000	0.000	Continuing	Continuing
645601: <i>Space System Prototype Transition</i>	-	0.000	142.045	8.787	0.000	8.787	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Per FY 2016 National Defense Authorization Act, the Evolved Expendable Launch Vehicle (EELV) program was renamed National Security Space Launch (NSSL) program. In association with the NSSL name change direction, the Air Force has renamed the Long Duration Propulsive (EELV Secondary Payload Adapter (ESPA)) (LDPE) program to be the ROOSTER program. Pre-existing LDPE-1, LDPE-2 and LDPE-3A mission names will remain unchanged.

**A. Mission Description and Budget Item Justification**

In FY2021, PE 1206427F, Space Systems Prototype Transitions (SSPT) efforts were transferred to Appropriation 3620F, Research, Development, Test & Evaluation, Space Force, PE 1206427SF, Space Systems Prototype Transitions (SSPT) from Appropriation 3600F, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

\$8.787M is included in FY 2021 in the request for Appropriation 3600, Research, Development, Test & Evaluation, Air Force, PE 1206427F; these funds should have been requested under Appropriation 3620 Research, Development, Test & Evaluation, Space Force, PE 1206427SF.

The Space System Prototype Transition (SSPT) Program will identify and address space technology and capability gaps in order to facilitate technology transition to military space prototypes and programs of record. It will conduct a wide array of activities to model, integrate, test, and provide launch integration and support on-orbit testing of prototype technologies. The supported activities include: systems engineering, technology planning, development, demonstrations and testing, as well as modeling, simulations and exercises to support the development and maturation of tactics and procedures. This includes the development and prototyping of critical technology within the Department of Defense, across other government agencies, academic institutions and industry partners that are identified and the necessary systems engineering to effectively employ such systems.

Specifically the SSPT project will include a cost-effective framework to identify, mature and transition demonstrations and prototypes to:

- Rapidly address identified technology or capability gaps
- Accelerate the maturation of systems intended for demonstrations/prototypes that enhance/compliment/replace an existing capability
- Support a more reliable, available, maintainable and survivable military space enterprise
- Energize the space industrial base supporting U.S. national security
- Focus S&T Innovation and facilitate its transition to military space programs of record

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>
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This program includes efforts for Rapid On-Orbit Space Technology Evaluation Ring (ROOSTER), Tetra, Blackjack, Quasi-Zenith Satellite System (QZSS)-Hosted Payload (HP) and Military Application of the Space Environment (MASE):

ROOSTER is designated to provide a flexible orbit capability to host and deploy numerous prototypes and payloads utilizing excess payload margin available on AFSPC launch missions.

Tetra will provide training platform for operators to develop and demonstrate tactics, techniques and procedures for prototype missions. The experiment directly supports the evolution of U.S. space situational awareness and control.

Blackjack is a joint technology demonstration project by DARPA and the Air Force to evaluate military utility and concepts of operation for a Proliferated Low Earth Orbit (P-LEO) satellite constellation. The project leverages industry innovation in commercial P-LEO concepts by integrating military payloads onboard commercial commoditized satellite vehicles, demonstrating onboard data processing and autonomous tasking, and transmitting encrypted data through a mesh network of satellites in LEO with the goals of augmenting existing warfighter capability, increasing national security space resiliency, and decreasing per-unit satellite costs.

QZSS-HP is a "pacesetter" hosted payload that is a high priority for the U.S. and Japan, paving the way for future Allied collaborations. It enhances Geostationary Earth Orbit (GEO) Space Situational Awareness capabilities over the Eurasian theater and facilitates resilient capabilities in the Space Surveillance Network (SSN).

MASE effort will demonstrate mature space environment technology to improve combat operations. MASE will enhance regional ionospheric specification (nowcasts) and predictions (forecasts) affecting signal propagation paths. MASE uses traditional and non-traditional ionospheric measurements in advanced space environment models to forecast and predict impacts to weapon systems. It contributes to satisfying Gaps 4 and 7 of the Space-Based Environmental Monitoring (SBEM) requirements. MASE was a new start in FY 2019 in the Weather System Follow-On Program, PE 1206422F, and transferred to the Space Systems Prototype Transitions (SSPT) program PE 1206427F in FY 2021.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver SSPT capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	142.045	142.855	0.000	142.855
Current President's Budget	0.000	142.045	8.787	0.000	8.787
Total Adjustments	0.000	0.000	-134.068	0.000	-134.068
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-134.068	0.000	-134.068

**Change Summary Explanation**

FY 2021: \$142.855M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

FY 2021: \$8.787M: Upward adjustment to fund MASE effort; funds did not transferred properly from RDT&E, Air Force to RDT&E, Space Force R-1 Line #5.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Technology Maturation and Prototype Development</p> <p><b>Description:</b> Plan, develop, test and transition advanced technologies into space system prototypes and capabilities to meet known and emerging threats. Conduct architecture studies, modeling and simulation, technical development, integration and test activities in preparation for transition of critical technologies into prototypes or space programs of record. Develop advanced capabilities for rapid prototyping and integration into space system programs of record and, if requested, to war-fighter Urgent Operational Needs (UONs) and Joint Urgent Operational Needs (JUONs).</p> <p><b>FY 2020 Plans:</b> Continue prototype/technology developments across multiple mission areas, including but not limited to:                      - LDPE: Complete and deliver LDPE-2 and begin design, assembly, and integration and testing of LDPE-3 to support on-orbit technology demonstrations and prototypes.                      - Tetra: Continue development of Tetra-2 and -3 prototypes. Develop Tetra-4 micro-satellite to support experimentation and Tactics, Techniques and Procedure (TTP) development at GEO.                      - Blackjack: Continue technical analysis, design, development, test, integration and delivery of prototype, cyber, ground and data processing architecture as well as develop concepts of operations to support Command and Control (C2) system integration.</p>	0.000	113.895	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>- QZSS- HP development (International Cooperation): Continue design, development, build and test of the Hosted Payload Interface Unit and Space Situational Awareness (SSA) sensor for integration into a single payload intended for hosting on Japanese QZSS-HP.</p> <p>- Continue engineering of the XVI communications sensor prototype that will be used to develop concepts of operations to support C2 system integration. Air Force Research Laboratory's (AFRL) and SMC/AD's co-developed Sensor XVI prototype is a path-agnostic communications sensor for tactical fighters from LEO. Continue on orbit operations and data analysis.</p> <p>- Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>				
<p><b>Title:</b> Prototype Integration, Test and On-Orbit Prototype Demonstration</p> <p><b>Description:</b> Provide rideshare opportunities for prototypes and experiments, fund mission-unique payload integration to the rideshare or launch system, and conduct launch base integration, testing and launch operations. Conduct prototype integration and testing into the designated Command and Control system and provide operational support to conduct prototype testing, demonstration and operations.</p> <p><b>FY 2020 Plans:</b> Provide launch services, mission-unique payload integration, testing and launch operations for prototypes and experiments, to include but not limited to:                      - LDPE-2: Provide systems and subsystems level baselines, architecture and integration planning and support for LDPE -2 payload providers and pre-launch readiness reviews and support.                      - Tetra-2: Provide payload integration and testing support for Tetra-2.                      - Prototype experimental operations in support of LDPE-2 and Tetra-2                      - Blackjack: Conduct technical reviews, integration and testing of prototypes with launch vehicle in support of launch and on-orbit demonstrations.                      - AFRL Sensor XVI continue Assembly Integration and Test (AI&amp;T) and launch integration.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>		0.000	28.150	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A			
<p><b>Title:</b> Military Application of the Space Environment (MASE)</p> <p><b>Description:</b> MASE is not a new start as it was previously funded in Appropriation 3600, RDT&amp;E, Air Force, PE 1206422F, Weather System Follow-on.</p> <p>FY21 funds for the MASE effort did not transfer properly from RDT&amp;E, Air Force to RDT&amp;E, Space Force R-1 Line #5.</p> <p>MASE demonstrates a sensor-to-shooter solution to improve mission effectiveness by providing commanders an operational risk assessment tool. MASE will deliver a capability comprised of weapon system tailored visualizations/decision aids to allow warfighter integration into operational plans and tactics, techniques, and procedures. MASE products and services will be evaluated using quantitative standard measures of performance, effectiveness and outcome against theater operational requirements.</p> <p><b>FY 2021 Plans:</b> Continue to conduct studies and perform technical analysis for external data sources and system integration, optimal sensor laydown, and system development. Continue to enhance and improve MASE-related prototypes and models while maintaining Risk Management Framework (RMF) compliance. Conduct field campaigns to validate scientific algorithms, provision cloud services, and deploy ionospheric ground sensors. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	-	-	8.787
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	142.045	8.787

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible. The SSPT program consists of numerous small projects in which the program office will leverage rapid prototyping authorities to the maximum extent possible.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>

In May 2019 the first three LDPE systems were awarded competitively. The LDPE Acquisition Strategy was amended to include the addition of LDPE-3A. LDPE-3A was justified to be awarded sole source as an option to the existing contract. The acquisition strategy for the follow-on effort to LDPE, called ROOSTER is in work, but expected to be competitively awarded.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>	<b>Project (Number/Name)</b> 645601 / <i>Space System Prototype Transition</i>
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Tetra-1,2 & 3 Integration & On-Orbit Prototype Demonstration	C/FFP	Various : Various	-	-		2.350	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
Tetra-3 & 4 Development	C/FFP	York Space Systems : Denver, CO	-	-		11.660	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
Sensor XVI	C/FFP	Viasat : Carlsbad, CA	-	-		1.150	Jan 2020	-		-		-	Continuing	Continuing	-
LDPE-1, 2 & 3A Launch Vehicle Integration & Ops	C/CPFF	Northrop Grumman Inno Sys : Dulles, VA	-	-		11.000	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
LDPE-3A Development	SS/FFP	Northrop Grumman Inno Sys : Dulles, VA	-	-		31.694	Feb 2020	0.000		-		0.000	Continuing	Continuing	-
Blackjack Development	MIPR	Various : Various	-	-		55.000	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
QZSS-HP Development	Various	Various : Various	-	-		20.369	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
MASE Development	C/Various	Various : CO	-	-		-		8.787	Nov 2020	-		8.787	Continuing	Continuing	-
<b>Subtotal</b>			-	-		133.223		8.787		-		8.787	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
FFRDC	RO	Various : Various	-	-		3.600	Jan 2020	0.000		-		0.000	Continuing	Continuing	-
A&AS	Various	Various : Various	-	-		4.882	Feb 2020	0.000		-		0.000	Continuing	Continuing	-
Other Support	Various	Various : El Segundo, CA	-	-		0.340	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	-		8.822		0.000		-		0.000	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Air Force</b>								<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 3600 / 4				<b>R-1 Program Element (Number/Name)</b> PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>				<b>Project (Number/Name)</b> 645601 / <i>Space System Prototype Transition</i>				
	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	-	-	142.045		8.787		-		8.787	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force			<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 3600 / 4		<b>R-1 Program Element (Number/Name)</b> PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>			<b>Project (Number/Name)</b> 645601 / <i>Space System Prototype Transition</i>		

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Technology Maturation and Prototype Development</b>																											
Tetra-2 Development																											
Tetra-3 Development																											
Tetra-4 Development																											
Sensor XVI																											
LDPE-2 Development																											
LDPE-3A Development																											
Blackjack Development																											
QZSS-HP: HPIU Development																											
QZSS-HP: SSA Development																											
Technology Maturation and Prototype																											
<b>Prototype Integration, Test and On-Orbit Prototype Demonstration</b>																											
Tetra-2, 3 & 4 Launch and On-Orbit Prototype Demonstration																											
Senor XVI and On-Orbit Prototype Demonstration																											
LDPE-1, 2, 3A & ROOSTER Launch and On-Orbit Prototype Demonstration																											
Blackjack Launch/Support Activities																											
Prototype Integration, Test and On-Orbit Prototype																											
<b>MASE</b>																											
MASE Development																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>	<b>Project (Number/Name)</b> 645601 / <i>Space System Prototype Transition</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Technology Maturation and Prototype Development</i></b>				
Tetra-2 Development	1	2020	2	2020
Tetra-3 Development	1	2020	4	2020
Tetra-4 Development	3	2020	4	2020
Sensor XVI	1	2020	4	2020
LDPE-2 Development	1	2020	2	2020
LDPE-3A Development	2	2020	4	2020
Blackjack Development	1	2020	4	2020
QZSS-HP: HPIU Development	1	2020	4	2020
QZSS-HP: SSA Development	1	2020	4	2020
Technology Maturation and Prototype	1	2020	4	2020
<b><i>Prototype Integration, Test and On-Orbit Prototype Demonstration</i></b>				
Tetra-2, 3 & 4 Launch and On-Orbit Prototype Demonstration	1	2020	4	2020
Senor XVI and On-Orbit Prototype Demonstration	3	2020	4	2020
LDPE-1, 2, 3A & ROOSTER Launch and On-Orbit Prototype Demonstration	1	2020	4	2020
Blackjack Launch/Support Activities	4	2020	4	2020
Prototype Integration, Test and On-Orbit Prototype	1	2020	4	2020
<b><i>MASE</i></b>				
MASE Development	1	2021	4	2021



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206434F / <i>Midterm Polar MILSATCOM System</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	66.122	370.353	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	436.475
643720: <i>EPS Recapitalization</i>	66.122	370.353	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	436.475
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	

**Program MDAP/MAIS Code:** 121

**Note**

In FY 2020, Project 643720, EPS Recapitalization, funds transferred to PE 1206432F, Polar MILSATCOM (SPACE), Project 654215, EPS Recap, in order to better align with the Enhanced Polar System program.

**A. Mission Description and Budget Item Justification**

The Enhanced Polar System Recapitalization (EPS-R) program will provide continuous, protected, Low Probability of Intercept/Low Probability of Detection communications to tactical and strategic warfighters in the North Polar Region in benign and contested environments. EPS-R will develop and acquire 1) two Extremely High Frequency (EHF) payloads, using Advanced EHF's eXtended Data Rate (XDR) waveform, on hosted spacecraft, 2) upgrades/modifications to the existing Enhanced Polar System (EPS) Control and Planning Segment (CAPS) to provide command and control and XDR mission planning capability, and 3) upgrades/modifications to the existing EPS gateway to provide connectivity between polar and midlatitude users through the Global Information Grid.

The EPS-R program is timed to prevent a gap in Arctic Military Satellite Communications (MILSATCOM) coverage after EPS end of life. To ensure polar MILSATCOM continuity beyond FY 2025, the DoD has begun funding activities to bridge the gap between the current EPS program and future protected systems being planned for the late 2020s. The EPS-R program has examined performance, mission needs, schedules, and costs to avoid a mission gap. EPS-R intends to host the payloads on a Space Norway bus, which is scheduled to launch in FY 2023. EPS-R will reuse EPS Gateway and ground control elements to the greatest extent feasible.

To meet the warfighter requirements for protected tactical and strategic polar MILSATCOM, RDT&E funding is required to continue program office and other related support activities that may include, but are not limited to studies, technical analysis, architectural development, acquisition strategy development, system requirements and system trades analysis, risk reduction activities, technology maturation, system engineering, integration and test of all polar MILSATCOM segments and hosted payloads.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 1206434F I Midterm Polar MILSATCOM System
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver EPS-R capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	383.113	0.000	0.000	0.000	0.000
Current President's Budget	370.353	0.000	0.000	0.000	0.000
Total Adjustments	-12.760	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-12.760	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Payload</p> <p><b>Description:</b> Develop and acquire two EHF payloads, using AEHF's XDR waveform, for integration on host spacecraft.</p> <p><b>FY 2020 Plans:</b> Effort has transitioned to PE 1206432F.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	329.070	0.000	0.000
<p><b>Title:</b> Ground Upgrades</p> <p><b>Description:</b> Modify and upgrade the existing EPS CAPS to provide command and control and XDR mission planning capability for the two new payloads.</p> <p><b>FY 2020 Plans:</b></p>	30.247	0.000	0.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 1206434F I Midterm Polar MILSATCOM System
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Effort has transitioned to PE 1206432F. <i><b>FY 2021 Plans:</b></i> N/A <i><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></i> N/A			
<i><b>Title:</b></i> Gateway Upgrades <i><b>Description:</b></i> Modify and upgrade the existing EPS Gateway Segment to support the two new payloads. <i><b>FY 2020 Plans:</b></i> Effort has transitioned to PE 1206432F. <i><b>FY 2021 Plans:</b></i> N/A <i><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></i> N/A	11.036	0.000	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	370.353	0.000	0.000

**D. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 05 PE 1206432F: <i>Polar MILSATCOM (Space)</i>	25.480	412.400	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	437.880

**Remarks**  
Other Program Funding above for PE 1206432F includes two projects. FY19 funds Project 657105, Polar Satellite Communications, aka Enhanced Polar System (EPS). FY20 funds Project 654215, EPS Recap.

**E. Acquisition Strategy**  
Awarded payloads contract to Northrop Grumman Aerospace Systems (NGAS) and initiated fabrication of two EPS functional equivalent payloads in FY 2018. Conducted market research to identify industry capabilities and acquisition concepts. Awarded CAPS contract for EPS ground upgrade. Gateway updates will be accomplished by Naval Information Warfare Center Pacific, the EPS Gateway Segment developer. The program office initiated the procurement of a replacement terminal for the Telemetry and Command Terminal. This acquisition strategy updates the EPS Ground Segment to accommodate the EPS functional equivalent payloads and extend operations and sustainment beyond 2028. The U.S. Government will retain the system integrator role, as it was for EPS program of record.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206434F / Midterm Polar MILSATCOM System	<b>Project (Number/Name)</b> 643720 / EPS Recapitalization
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EPS-R Tactical Payloads 1-2	SS/CPIF	NGAS : Redondo Beach, CA	66.099	292.224	Oct 2018	-		-		-		-	0.000	358.323	-
Control and Planning Segment Upgrades	SS/CPIF	NGMS : Redondo Beach, CA	0.000	26.860	May 2019	-		-		-		-	0.000	26.860	-
Gateway Upgrades	Various	Various : CA	0.000	9.800	May 2019	-		-		-		-	0.000	9.800	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	0.000	4.325	Nov 2018	-		-		-		-	0.000	4.325	-
Enterprise SE&I	C/CPAF	LinQuest : Los Angeles, CA	0.000	23.589	Nov 2018	-		-		-		-	0.000	23.589	-
<b>Subtotal</b>			66.099	356.798		-		-		-		-	0.000	422.897	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	MIPR	Aerospace : El Segundo, CA	0.000	0.790	Nov 2018	-		-		-		-	0.000	0.790	-
A&AS	Various	Various : Various	0.000	12.615	Nov 2018	-		-		-		-	0.000	12.615	-
Other Support	Various	Various : Various	0.023	0.150	Oct 2018	-		-		-		-	0.000	0.173	-
<b>Subtotal</b>			0.023	13.555		-		-		-		-	0.000	13.578	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	66.122	370.353	0.000	-	-	-	0.000	436.475	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206434F / <i>Midterm Polar MILSATCOM System</i>	<b>Project (Number/Name)</b> 643720 / <i>EPS Recapitalization</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b><i>Payload</i></b>																												
Long Lead Parts	██████████																											
Payload Segment Design/Build	██████████																											
Preliminary Design Review (PDR)	██																											
International Collaboration w/ Norway		██████████																										
Critical Design Review (CDR)				██																								
<b><i>Ground and Gateway Upgrades/ Modifications</i></b>																												
Risk Reduction Activities/Studies	██████████																											
Upgrades/Modifications	██████████																											
Control and Planning Segment Upgrades, Contract Award				██																								

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206434F / <i>Midterm Polar MILSATCOM System</i>	<b>Project (Number/Name)</b> 643720 / <i>EPS Recapitalization</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Payload</i></b>				
Long Lead Parts	1	2019	4	2019
Payload Segment Design/Build	1	2019	4	2019
Preliminary Design Review (PDR)	1	2019	1	2019
International Collaboration w/ Norway	2	2019	4	2019
Critical Design Review (CDR)	4	2019	4	2019
<b><i>Ground and Gateway Upgrades/Modifications</i></b>				
Risk Reduction Activities/Studies	1	2019	4	2019
Upgrades/Modifications	1	2019	4	2019
Control and Planning Segment Upgrades, Contract Award	3	2019	3	2019

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206438F / <i>Space Control Technology</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	68.604	58.231	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
642611: <i>Technology Insertion Planning and Analysis</i>	-	68.604	58.231	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY2021, PE 1206438F, Space Control Technology efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206438SF Space Control Technology from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

This project supports a range of activities including systems engineering, technology planning, development, demonstrations and prototyping, and testing, as well as modeling, simulations and exercises to support development and maturation of tactics and procedures for a responsive and resilient Space Control mission area. This includes technology development and prototyping for Defensive Counterspace (DCS) and Offensive Counterspace (OCS) and the necessary systems engineering for the warfighter to effectively employ such systems.

Specifically supported are DCS and Space Situational Awareness (SSA) activities which include developing threat warning payloads for monitoring, detecting, identifying, tracking, assessing, verifying, categorizing, and characterizing objects and events in space. Additionally, this activity supports the development of payload prototypes and space defense force packages for protecting U.S. space systems, resources, and operations from enemy attempts to negate, interfere, or destroy them.

Specific OCS activities include disruption, denial, or degradation (and associated Electronic Support) of adversary space systems which may be used for purposes hostile to U.S. national security interests. Rapid Reaction Capabilities in response to immediate warfighter needs in the Space Control mission area are developed within this program.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Space Control Technology (SCT) weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

Funding for this exhibit is contained in PE 1206438F.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206438F / <i>Space Control Technology</i>
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This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	91.646	64.231	75.200	0.000	75.200
Current President's Budget	68.604	58.231	0.000	0.000	0.000
Total Adjustments	-23.042	-6.000	-75.200	0.000	-75.200
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-6.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-20.044	0.000			
• SBIR/STTR Transfer	-2.998	0.000			
• Other Adjustments	0.000	0.000	-75.200	0.000	-75.200

**Change Summary Explanation**

FY 2019: \$20.044M decrease for higher Air Force priorities.

FY 2020: \$6.000M decrease to account for the availability of prior year execution balances.

FY 2021: -\$75.200M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Rapid Reaction Branch	21.105	19.284	0.000
<b>Description:</b> Develops advanced capabilities for rapid prototyping and integration into space control programs of record and, if requested, to warfighter Urgent Operational Needs (UONs) and Joint Urgent Operational Needs (JUONs). Conducts prototype capability development, testing, training and rapid transition of technology and techniques to space control systems. Sustains deployed quick reaction capabilities until transition to program of record or mission completion.			
<b>FY 2020 Plans:</b> Develop, test, train, field, transition and sustain advanced rapid reaction capabilities in response to emergent requirements from multiple Combatant Commands. Conduct initial technical development and integration activities against relevant threat systems and technologies in preparation for operational requirements. Develop and test advanced prototypes in support of activities within the Space Control Technology portfolio. Integrate and evaluate relevant Government Reference Architecture (GRA) Increment 4 technologies. Integrate information assurance constructs and controls into developmental platforms to expedite fielding. Execute			



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206438F / <i>Space Control Technology</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>field development &amp; test activities, at CONUS &amp; OCONUS locations, to verify system performance in the operational environment. Enhance fielded rapid reaction capabilities in response to evolving threats and operator feedback. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>				
<p><b>Title:</b> Experimentation Platforms &amp; Defense Force Packaging</p> <p><b>Description:</b> This effort will acquire, outfit and operate microsat busses with the primary purpose of demonstrating new technologies, flight testing payloads or subsystems, and validating Tactics, Techniques, and Procedures (TTPs) to ensure the delivery of critical space effects throughout all phases of a future space conflict against an adaptive and thinking adversary. It also supports a range of activities developing, prototyping, and fielding a family of on-board and near-board, modular resilience payloads supporting threat warning and protection options for National Security Space High-Value satellites. These payloads will be integrated with enterprise command and control capabilities for tasking, reporting, and response. On-orbit prototype demonstrations will be performed to demonstrate sensor/payload capabilities for high-value satellite force packaging requirements. Systems Engineering will enable the integration, interoperability and compatibility of new space control technology systems and capabilities amongst each other and amongst these new systems and the existing space control enterprise.</p> <p><b>FY 2020 Plans:</b> Continue development of selected sensor/response payloads (from mod/sim and analysis efforts) for prototype demonstrations for threat warning and response payloads for high-value satellites. Continue prototype and operations ground infrastructure design trades and build-out in support of space command and control (C2) and space range requirements. Perform risk reduction efforts to define high-value satellite bus requirements for force packaging on-ramps.</p> <p>Create and mature systems engineering models for space control scenarios and consolidate separate program artifacts into an interconnected virtual representation of the SY enterprise. Exercise those models to determine critical paths and nodes, timing requirements, risks, and opportunities.</p> <p>Define various systems engineering functions, tools, procedures, and best practices to accelerate acquisition of successful and affordable space systems. Perform systems engineering support tasks. Perform maturation and transition of new technology, and technology needs identification, prioritization, and solution development. Rapidly respond to implement system resiliency and</p>		47.499	38.947	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206438F / <i>Space Control Technology</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.  <b>FY 2021 Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	68.604	58.231	0.000

**D. Other Program Funding Summary (\$ in Millions)**  
 N/A

**Remarks**

**E. Acquisition Strategy**  
 All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206438F / <i>Space Control Technology</i>	<b>Project (Number/Name)</b> 642611 / <i>Technology Insertion Planning and Analysis</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
SCT Counterspace Technology Prototyping/ Rapid Reaction Development	Various	Various : Various	-	19.504	Jan 2019	17.764	Jan 2020	-		-		-	Continuing	Continuing	-
SCT Foundational Architecture	C/FFP	TBD : El Segundo, CA	-	10.475	Feb 2019	11.884	Jan 2020	-		-		-	0.000	22.359	-
SCT Experimentation Platforms Sensors	C/CPIF	Various : Various, CA	-	4.709	Jan 2019	-		-		-		-	0.000	4.709	-
SCT Experimentation Platforms Microsat Buses	C/FFP	Various : Various, CA	-	5.766	Jan 2019	-		-		-		-	0.000	5.766	-
SCT Modeling & Sim; Payload Analysis and Alternatives	C/Various	Various : Various, CA	-	8.218	May 2019	6.500	Dec 2019	-		-		-	0.000	14.718	-
SCT OCO Funding P3I	Various	Various : Various	-	1.100	Jan 2019	-		-		-		-	0.000	1.100	-
SCT Sensor Prototype Development	C/Various	Various : Various, CA	-	12.086	Feb 2019	17.063	Jan 2020	-		-		-	0.000	29.149	-
SCT Ground Infrastructure	Various	Various : Various, CA	-	0.500	Oct 2018	2.500	Oct 2019	-		-		-	0.000	3.000	-
SCT High-Value Satellite Bus Requirements	Various	Various : Various, CA	-	1.500	Feb 2019	1.000	Oct 2019	-		-		-	0.000	2.500	-
<b>Subtotal</b>			-	63.858		56.711		-		-		-	Continuing	Continuing	N/A

**Remarks**  
N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Civilian Reimbursable Budget Authority	Various	Space and Missile Systems Center : El Segundo, CA	-	0.180	Oct 2018	-		-		-		-	0.000	0.180	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 4				PE 1206438F / Space Control Technology				642611 / Technology Insertion Planning and Analysis							
<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
<b>Subtotal</b>			-	0.180		-		-		-		-	0.000	0.180	N/A
<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
A&AS	Various	Various : Various, CA	-	3.266	Feb 2019	1.520	Jan 2020	-		-		-	Continuing	Continuing	-
FFRDC	Various	Various : Various, CA	-	1.000	Oct 2018	-		-		-		-	0.000	1.000	-
Other Support	Various	Various : Various, CA	-	0.300	Oct 2018	-		-		-		-	0.000	0.300	-
<b>Subtotal</b>			-	4.566		1.520		-		-		-	Continuing	Continuing	N/A
			Prior Years	FY 2019	FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>			-	68.604	58.231	-		-		-		Continuing	Continuing	N/A	
<b>Remarks</b>															



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206438F / <i>Space Control Technology</i>	<b>Project (Number/Name)</b> 642611 / <i>Technology Insertion Planning and Analysis</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>RRB</b>				
Rapid Prototyping	1	2019	4	2020
Signal Processing Lab Gov't Reference Architecture (GRA) Dev Inc 3	1	2019	2	2019
Signal Processing Lab GRA (dev) Increment 4	1	2019	4	2020
Capability Integration (Lab)	1	2019	4	2020
Capability tests (execute/report)	1	2019	4	2020
Ongoing capability DT planning/execution	1	2019	4	2020
<b>Experimentation Platforms &amp; Defense Force Packaging</b>				
Military Utility Assessment	1	2019	4	2020
Database of Architectural Elements	1	2019	4	2020
Modeling & Simulation; Payload Analysis and Alternatives	1	2019	4	2020
Sensor Prototype Development	1	2019	4	2020
Ground Infrastructure	1	2019	4	2020
SCT High-Value Satellite Bus Requirements Definition	2	2019	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206730F / <i>Space Security and Defense Program</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	45.542	56.385	56.311	0.000	56.311	68.655	79.558	80.530	50.618	Continuing	Continuing
64A025: <i>Space Protection Program</i>	-	45.542	56.385	56.311	0.000	56.311	68.655	79.558	80.530	50.618	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Program Element funds the Department of Defense (DoD)/Air Force component of the Space Security and Defense Program (SSDP). The SSDP is a Joint DoD and Office of the Director of National Intelligence (ODNI) organization established to function as the center of excellence for options and strategies (materiel, non-materiel, cross-Title, cross-domain) leading to a more resilient and enduring National Security Space (NSS) Enterprise. The SSDP operates under the authority of the Deputy Secretary of Defense (DEPSECDEF) and Principal Deputy Director of National Intelligence (PDDNI) to lead and collaborate on space protection vulnerability, susceptibility, and mitigation assessments of NSS services for the purpose of identifying, assessing, validating and introducing protection solutions into existing requirements, budgeting, acquisition, technology development and operational development processes. This unique mission provides an ongoing and crucial core protection competency that advances specific projects/activities (including non-kinetic techniques) to deliver comprehensive, economical and actionable solutions for both programmatic and operational domains.

The SSDP scope spans multiple space missions and stakeholders including the DoD, Intelligence Community (IC), civil, commercial, and international space entities that support NSS missions in both peacetime and throughout all phases of conflict. It is focused on being responsive to NSS stakeholders in providing technical and operational assessments of emergent threat concepts, and developing near-term and far-term plans to address strategies, threats, and vulnerabilities. Specific SSDP Projects are structured/ designed to have an impact across all time horizons; near-term focused efforts to complicate adversary operations, mid-term focused efforts to improve system and enterprise survivability, and long-term focused efforts to render adversary capabilities ineffective.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver SSDP capability leading to a more resilient and enduring NSS enterprise. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 1206730F I Space Security and Defense Program
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	45.542	56.385	56.414	0.000	56.414
Current President's Budget	45.542	56.385	56.311	0.000	56.311
Total Adjustments	0.000	0.000	-0.103	0.000	-0.103
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-0.103	0.000	-0.103

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Space Protection and Survivability</p> <p><b>Description:</b> SSDP organizes, plans, and executes specific projects in three focus areas: Enterprise Capabilities &amp; Solutions; Mission Area Protection Concepts &amp; Architectures; and Operational Tactics, Experiments &amp; Prototypes. Enterprise Capabilities &amp; Solutions projects focus on identifying and advocating for NSS enterprise-level protection requirements and architecture updates/modifications, informing/assisting policy-makers and analyzing policy to enhance the space protection posture across the NSS Enterprise. Mission Area Protection Concepts &amp; Architectures projects constitute Protect and Defend (P&amp;D) efforts focused on specific mission areas and/or systems. These projects entail the specific technical efforts, activities and engagements supporting capability and architecture development in mission areas such as Space Control, Command and Control (C2), Satellite Communication (SATCOM), Position-Navigation and Timing (PNT), Missile Warning (MW), Space Situational Awareness (SSA), Indications and Warning (I&amp;W), and Intelligence - Surveillance - Reconnaissance (ISR). Finally, Operational Tactics, Experiments &amp; Prototypes projects leverage operations expertise, experimentation and prototyping to improve operational capabilities and develop, refine, document and demonstrate Tactics, Techniques and Procedures (TTPs), Concepts of Operation (CONOPS), and associated C2 functions. Some of these projects hold the potential to leave-behind residual operational prototypes/capabilities when partnered with the appropriate mission organization. Additionally, these projects will support development of TTPs and CONOPS for protection solutions developed by SSDP partners across the NSS Enterprise. Projects in all three areas will include non-kinetic solutions for protecting specific capabilities and the NSS Enterprise.</p> <p><b>FY 2020 Plans:</b> FY2020 projects are designed and proposed in response to emerging, validated adversary threats and the associated mission priorities of the DoD and IC. While these efforts are responsive to the emerging and changing threat climate, they remain purposeful in furthering the integration of DoD &amp; IC space protection efforts through technical engineering-based</p>	45.542	56.385	56.311



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206730F / <i>Space Security and Defense Program</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<p>analysis, modeling &amp; simulation (M&amp;S), and operator engagement; delivering targeted analysis, policy recommendations, and initiatives across the full spectrum of the program's chartered activities. Specifically, project prioritization and content was informed by tailored threat characterizations, drawn from IC reporting and internal technical analysis, to account for potential evolutionary threat developments and to ensure the enduring effectiveness of proposed threat mitigation solutions. The threat characterizations were then decomposed to identify potential vulnerabilities for exploitation by the specific projects ensuring the application of resources against the highest-priority projects and most impactful threat mitigation efforts. For FY2020 in support of Enterprise Capabilities &amp; Solutions efforts the program will utilize Modeling, Simulation &amp; Analysis (MS&amp;A) tools to: Rapidly assess outcomes of integrated space and terrestrial scenarios for a variety of architectures to understand how protection options impact the outcome of a multi-domain scenario; design and execute demonstrations and changes necessary for tactically relevant SSA; integrate lower-cost, non-traditional data sources and determine their value for the protect and defend mission; execute initial work looking at protection scenarios for Proliferated Low Earth Orbit (PLEO) systems; and ensure activities track with National guidance on the proper protection for high profile next-generation, multi-mission, on-orbit experiments. Additionally, in support of the Mission Area Protection Concepts &amp; Architectures focus area, the program will: demonstrate the capability to analyze mission specific architectures for their resilience attributes; develop a library of effective responses to adversary actions to speed decision making and improve response results for specific mission systems; and provide resilience recommendations to program offices, and enterprise/system requirements definition efforts in order to align resilience strategies with acquisition strategies. Finally, for Operational Tactics, Experiments &amp; Prototypes projects, the program will: develop force packages for Combatant Commanders providing them a first-of-its-kind ability to employ multiple options across all phases of conflict vs. specific adversary capabilities; leverage existing data-science software integration approaches to enable Operational Level Space C2 Courses of Action (COA) planning and quantitative analysis of COA results; demonstrate how this approach allows for quick prototyping of new tools, easy synchronization of existing tools, and risk reduction prior to transition of prototypes to programs of record; further development of a learning environment to rapidly close C2 technology knowledge gaps, develop a multi-domain C2 prototype/test environment and identify/refine C2 performance metrics and standards; and develop Tactics, Techniques and Procedures (TTPs) to take full advantage of planned and programmed future capabilities along with the necessary technical detail to support their integration into Combatant Commander plans (once fielded). In addition to these and other planned activities, the program will utilize in-depth technical analysis, and tailored M&amp;S to deliver actionable, timely and efficient protection solutions in response to emerging and time-sensitive high-priority DoD &amp; IC space initiatives and evolving NSS Enterprise needs. Many of these activities will be executed with our mission partners, either in-house or in their facilities, to ensure the best application and use of toolsets, expertise and technology</p> <p><b>FY 2021 Plans:</b> FY2021 program activities will focus on in-depth technical analysis utilizing tailored modeling &amp; simulation (M&amp;S) complemented by focused warfighter/operator engagements in support of both pre-planned and emergent NSS protection analysis, experimentation and prototyping goals. The program will be responsive to time sensitive and evolving enterprise requirements</p>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206730F / <i>Space Security and Defense Program</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<p>throughout the year while maintaining momentum on addressing enduring and projected space protect and defense requirements at both the system and enterprise levels. Specific program projects are selected based on a deep understanding of the threat enabled by the program's extensive ties to the larger NSS and Intelligence Community (IC). The program will use the IC's foundational assessments, combined with engineering analysis, to craft threat characterizations; capturing both current and evolved/future capabilities which are tailored to inform SSDP's priorities and associated project activities. These tailored products will support studies, experiments, and analysis to identify potential opportunities to counter threats across their operational envelopes. The program will then evaluate the effectiveness of exploiting these opportunities, alone or in layered packages, against the projected threats. Finally, based on this analysis, the program will initiate in-house, or with a mission partner, projects to exploit and combine these opportunities into a set of layered activities with the intended effect of countering adversary threats. Specific to FY2021, Enterprise Capabilities &amp; Solutions projects will utilize the program's broad and robust physics-based M&amp;S capabilities, its maturing campaign and enterprise level rapid analysis capabilities, and its experienced cadre of analysts to: Examine planned DOD and IC programs, experiments and demonstrations to provide protection recommendations to preserve U.S. capabilities; mature analysis capabilities focused on evaluating protection options for PLEO systems, and their impact on the space and multi-domain campaigns; recommend architecture and policy solutions/changes to optimize the deployment of new capabilities to deliver critical warfighting effects to include the necessary C2; influence policy and guidance across the NSS enterprise while advancing towards more resilient future architectures; and explore early phase reversible protect and defend Electronic Warfare (EW) related capabilities to provide greater flexibility and freedom of maneuver to win the space fight. FY2021 Operational Tactics, Experiments &amp; Prototypes projects will incorporate C2, SSA, and Space Control concepts, planned capabilities and TTPs into relevant/targeted prototyping and experimentation activities to: Mature and shape CONOPS for programed/anticipated systems through rigorous analysis informed by experimentation and prototyping (both in-house and with/through mission partners); develop force packages for Combatant Commanders providing multiple options across all phases of conflict vs. specific adversary capabilities supported by tools allowing for operational level space C2 Course of Action (COA) planning informed by quantitative analysis of COA results; and incorporate objectives to demonstrate Title 10/50 space protection coordination, explore data fusion and, potentially, include the integration of commercial tools and services. The program will accomplish these goals through in-depth technical analysis utilizing in-house high-fidelity M&amp;S tools, physics-based models, selective partnering with national labs, and advanced data studies and experimental data analytics along with other means/methods as required to deliver actionable, timely and efficient protection solutions. This deliberate variation in approach allows the program to tailor its efforts to the unique challenges and needs of each project and provide the analytical rigor essential for informing experiment/prototype selection and design to ensure the highest possible return on investment and mission impact. The program's FY2021 projects will have the combined impact of continuing to mature and enhance the protection-oriented tools, policies, requirements and programs necessary to maintain and accelerate progress towards achieving resilience across the NSS enterprise. In the face of an increasingly complex and contested space environment, this capacity and capability is central to</p>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206730F / <i>Space Security and Defense Program</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
national security space protection efforts and is a critical advancement for staying abreast and ahead of both current and next-generation threats.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	45.542	56.385	56.311

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible. The program consists of numerous small projects.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 4				PE 1206730F / Space Security and Defense Program				64A025 / Space Protection Program							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Space Protection and Survivability	Various	Various : Various	-	40.240	Nov 2018	50.893	May 2020	50.133	May 2021	-		50.133	Continuing	Continuing	-
<b>Subtotal</b>			-	40.240		50.893		50.133		-		50.133	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Support and Infrastructure (Gov't PMA)	Various	Various : Various	-	1.738	Nov 2018	1.589	Mar 2020	1.995	Mar 2021	-		1.995	Continuing	Continuing	-
Oversight, Advisory and other Technical Support (Contractor PMA)	Various	Various : Various	-	3.564	Nov 2018	3.903	Mar 2020	4.183	Mar 2021	-		4.183	Continuing	Continuing	-
<b>Subtotal</b>			-	5.302		5.492		6.178		-		6.178	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	45.542		56.385		56.311		-		56.311	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206730F / <i>Space Security and Defense Program</i>	<b>Project (Number/Name)</b> 64A025 / <i>Space Protection Program</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Space Protection and Survivability</i></b>	
Enterprise Capabilities Solutions	
Mission Area Protection Concepts and Architectures	
Operational Tactics, Experiments and Prototypes	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206730F / <i>Space Security and Defense Program</i>	<b>Project (Number/Name)</b> 64A025 / <i>Space Protection Program</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Space Protection and Survivability</i></b>				
Enterprise Capabilities Solutions	1	2019	4	2025
Mission Area Protection Concepts and Architectures	1	2019	4	2025
Operational Tactics, Experiments and Prototypes	1	2019	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206760F / <i>Protected Tactical Enterprise Service (PTES)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	45.009	105.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	150.012
643726: <i>PTES</i>	-	45.009	105.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	150.012
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206760F, Protected Tactical Enterprise Service (PTES) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206760SF, Protected Tactical Enterprise Service (PTES) from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

The global threat of electronic warfare attacks against space systems will expand in the coming years in both number and types of weapons. Threat development will very likely focus on jamming capabilities against dedicated military satellite communications (MILSATCOM). To address this critical need, the Air Force is developing the Protected Tactical Enterprise Service (PTES) ground system to provide worldwide, anti-jam, Low Probability of Intercept (LPI) communications for tactical warfighters. PTES will utilize the Protected Tactical Waveform (PTW) to provide anti-jam communications via military and commercial satellite systems for tactical users in all Services. Initially, PTES will utilize the Wideband Global SATCOM (WGS) system and be expanded later to include commercial satellites and the Protected Tactical SATCOM (PTS) system.

The PTES program is developing a mission management system (MMS), a key management system (KMS) and hub system to enable PTW via transponded WGS satellites, with future extension to commercial SATCOM. Production-representative PTW modems for user terminals are being developed by the Protected Tactical Service Field Demonstration (PTSFD) and will be separately acquired by each Service and by international partners.

To meet the warfighter requirements for protected tactical MILSATCOM and the capability gaps identified in these studies, RDT&E funding is required for architectural development, acquisition strategy development, system requirements and system trades analysis, and engineering, manufacturing, developing, testing and evaluating PTES systems and segments.

The PTES rapid prototype addresses an urgent operational need in the Pacific region by achieving Initial Operational Capability (IOC) in 2023. IOC provides ground elements for PTW over WGS and consists of PTES installation at two WGS Gateway sites utilizing one WGS satellite. The Navy Wideband Anti-Jam Modem System (WAMS) relies on PTES to provide PTW ground infrastructure. The Air Force is utilizing FY 2016 National Defense Authorization Act, Section 804, Middle Tier of Acquisition for Rapid Prototyping authority to deliver a PTES Operational Demonstration meeting the Navy's Minimum Viable Product in 2022. At Full Operational Capability (FOC) PTES will provide worldwide PTW operations using up to all WGS satellites.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships,

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206760F / <i>Protected Tactical Enterprise Service (PTES)</i>
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and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver PTES weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	46.419	105.003	123.841	0.000	123.841
Current President's Budget	45.009	105.003	0.000	0.000	0.000
Total Adjustments	-1.410	0.000	-123.841	0.000	-123.841
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.410	0.000			
• Other Adjustments	0.000	0.000	-123.841	0.000	-123.841

**Change Summary Explanation**

FY 2021: Funds were transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> PTES Prototype Development	45.009	105.003	0.000
<b>Description:</b> After competitive contract award, the PTES team will develop a prototype consisting of three segments: a MMS, a KMS, and joint hubs integrated into existing SATCOM gateways. PTES will enable an anti-jam communications capability via PTW over WGS for tactical users in all Services and International Partners. The PTES team will be responsible for developing all PTES segments and performing all system integration, including end-to-end tests of the complete PTES prototype.			
<b>FY 2020 Plans:</b>			



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206760F / <i>Protected Tactical Enterprise Service (PTES)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Continue PTES Prototype Development. Plan, develop, test and deliver the MMS, KMS, and Key Loading Initialization Facility (KLIF) Build 1 software for Government PTES Program Office testing on the Government approved Data Center environment. Conduct Risk Reduction Demonstration and Risk Reduction Test for Build 1. Continue program office and other related support that may include, but are not limited to studies, technical analysis, prototyping, etc.  <b>FY 2021 Plans:</b> N/A.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A.			
<b>Accomplishments/Planned Programs Subtotals</b>	45.009	105.003	0.000

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**  
Associated WAMS funding is contained within Navy Multiband Terminal (NMT) program.

**E. Acquisition Strategy**  
PTES was designated as a rapid prototype in June 2018 under section 804 of the National Defense Authorization Act for Fiscal Year 2016 (Public Law 114-92). The objective of the PTES ground system is to provide an operational anti-jam communications capability via WGS using PTW. The PTES acquisition approach is to competitively award a single contract to develop and field PTES, through declaration of IOC. Boeing and sub-contractors will be responsible for developing all PTES segments (MMS, KMS, and Hub) and performing all system integration, including end-to-end tests of the complete PTES prototype. The 45th Test Squadron is planned to be the PTES Developmental Test organization and Air Force Operational Test and Evaluation Center (AFOTEC) is planned to be the Operational Test organization.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206760F / <i>Protected Tactical Enterprise Service (PTES)</i>	<b>Project (Number/Name)</b> 643726 / <i>PTES</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Protected Tactical Enterprise Service Prototype Development	C/CPIF	Boeing : El Segundo, CA	-	27.261	Nov 2018	72.527	Oct 2019	-		-		-	0.000	99.788	-
Data Center	Various	Various : Various	-	0.126	Dec 2018	4.000	Feb 2020	-		-		-	0.000	4.126	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	4.791	Dec 2018	4.296	Jan 2020	-		-		-	0.000	9.087	-
Enterprise SE&I	Various	Various : Various	-	6.152	Dec 2018	9.928	Oct 2019	-		-		-	0.000	16.080	-
<b>Subtotal</b>			-	38.330		90.751		-		-		-	0.000	129.081	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Planning & Execution DT/OT	Various	Various : Various	-	2.041	Dec 2018	2.720	Nov 2019	-		-		-	0.000	4.761	-
<b>Subtotal</b>			-	2.041		2.720		-		-		-	0.000	4.761	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	MIPR	Aerospace : El Segundo, CA	-	2.227	Dec 2018	2.417	Jan 2020	-		-		-	0.000	4.644	-
A&AS	Various	Various : Various	-	2.261	Dec 2018	8.915	Oct 2019	-		-		-	0.000	11.176	-
Other Support	Various	Various : Various	-	0.150	Oct 2018	0.200	Oct 2019	-		-		-	0.000	0.350	-
<b>Subtotal</b>			-	4.638		11.532		-		-		-	0.000	16.170	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	45.009	105.003	-	-	-	0.000	150.012	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Air Force</b>							<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 3600 / 4			<b>R-1 Program Element (Number/Name)</b> PE 1206760F / <i>Protected Tactical Enterprise Service (PTES)</i>			<b>Project (Number/Name)</b> 643726 / <i>PTES</i>				
	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	

**Remarks**



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206760F / <i>Protected Tactical Enterprise Service (PTES)</i>	<b>Project (Number/Name)</b> 643726 / <i>PTES</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>PTES</b>				
PTES Prototype Development	1	2019	4	2020
Software Build 1	4	2019	3	2020
Software Build 2	3	2020	4	2020
Preliminary Design Review (PDR)	4	2020	4	2020
Developmental/Operational Testing (to include Planning)	1	2019	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206761F / <i>Protected Tactical Service (PTS)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	28.754	163.694	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	192.448
643728: <i>Protected Tactical SATCOM</i>	-	28.754	163.694	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	192.448
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206761F, Protected Tactical Service (PTS) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206761SF, Protected Tactical Service (PTS) from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

The global threat of electronic warfare attacks against space system will expand in the coming years in both number and types of weapons. Threat development will very likely focus on jamming capabilities against dedicated military satellite communications. To address this critical need, the Air Force is developing the Protected Anti-jam Tactical Satellite Communications (PATs) family-of-systems, of which the Protected Tactical Satellite Communications (PTS) program was a New Start in FY 2018 to fulfill the highest level of anti-jam capabilities to mitigate adversarial jamming effects. PTS provides worldwide and polar, beyond-line-of-sight, Anti-Jam (AJ), low-probability-of intercept communications in benign and highly-contested environments utilizing the Protected Tactical Waveform (PTW). PTS, with its on-board payload processing and antenna design, enables reliable tactical satellite communications within close proximities to adversarial jammers. The system also employs interfaces consistent with Air Force Space Command's on-going resilience initiatives and Enterprise Ground Services (EGS); thereby enhancing mission assurance, resiliency, and interoperability.

The Air Force is utilizing FY 2016 National Defense Authorization Act, Section 804, Middle Tier of Acquisition for Rapid Prototyping authority and Section 815, Other Transaction Authority (OTA), to achieve an affordable, rapid, operational capability for the tactical warfighter. This strategy employs spiral payload development to progressively and incrementally deploy prototypes with residual capabilities demonstrated in an operational environment. These spiral payload prototypes demonstrate innovative anti-jam technologies with modular and scalable payloads to meet validated military needs for protected tactical communications. This includes technical baseline development, systems engineering trade analyses, internal/external system integration and development, candidate system architecture evaluations, risk reduction demonstrations, prototyping concepts development, system testing, and enabling technologies maturation.

PTS includes a space segment, ground segment and gateway segment. For the space segment, the Air Force strategy utilizes a payload-centric focus to enable an affordable, resilient space architecture. This enables hosting and rideshare opportunities with other US government, commercial, International Partner satellites or integration onto a commodity satellite bus. For the ground segment, PTS leverages the EGS for satellite command and control, and the Protected Tactical Enterprise Service (PTES) rapid prototyping activity for mission and key management planning. The PTS gateway segment enables tactical warfighters reach back to global DoD Information Network. The PTS user terminal segment, not included in this PTS acquisition, will be procured by the military Services utilizing low-cost PTW modem upgrades enabled by the Protected Tactical Service Field Demonstration technology demonstration program.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206761F / <i>Protected Tactical Service (PTS)</i>
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Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver PTS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	29.626	173.694	253.392	0.000	253.392
Current President's Budget	28.754	163.694	0.000	0.000	0.000
Total Adjustments	-0.872	-10.000	-253.392	0.000	-253.392
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-10.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.872	0.000			
• Other Adjustments	0.000	0.000	-253.392	0.000	-253.392

**Change Summary Explanation**

FY 2020: -\$10.0M Congressional Directed Reduction for unjustified growth.

FY 2021: Funds were transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Acquisition Strategy Development & Source Selection	4.711	1.927	0.000
<b>Description:</b> Develop and refine the PTS acquisition strategy for rapid prototyping and fielding of hostable payloads with rideshare opportunities, free-flyer satellite bus configurations, and other potential solutions. This includes developing the request for prototype proposals to enable competitive selection of up to four payload prime contractors. In parallel to preparing for the			



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206761F / <i>Protected Tactical Service (PTS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
competitive selection, the Air Force is developing strategies for the acquisition of commodity buses, ground segment software and hardware, gateway segment terminals and equipment, risk reduction projects, and other supporting activities.				
<b>FY 2020 Plans:</b> Complete source selection for PTS rapid prototyping efforts. Competitively award rapid prototyping contracts for hosted payloads to up to four contractors. Develop and mature strategies for the acquisition of a bus or host provider, gateway terminals, and ground segment.				
<b>FY 2021 Plans:</b> N/A				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A				
<b>Title:</b> Technical Baseline Management and System Integration		24.043	29.269	0.000
<b>Description:</b> Perform Government as system integrator function through acquiring, designing, testing, and integrating key prototype segments and interfaces. Mature technical baseline and interface requirements for the prototype system. Conduct architectural engineering and system level integration planning for the PTS space, ground, and gateway segments. Support, configure, and conduct integrated testing of the major PTS subsystems, segments, and end-to-end prototype system. Manage the PTS open system architecture, refine interface requirements, and validate concept of operations through integrated system performance demonstrations. Beginning in FY 2021, the Space Hub End Cryptographic Unit (ECU) will be a separate thrust as a key risk mitigation project.				
<b>FY 2020 Plans:</b> Mature interface requirements for PTS space, ground, and gateway segments. Continue maturation and refinement of the technical baseline, system architecture, systems engineering trades and analyses. Continue risk reduction activities, prototype concept development, and initiate design and development of key system components such as the ECU.				
<b>FY 2021 Plans:</b> N/A				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A				
<b>Title:</b> PTS Rapid Prototype Design and Development		0.000	132.498	0.000
<b>Description:</b> Rapid prototyping of PTS space, ground, and gateway segments and key system components. Develop, demonstrate, test, and evaluate PTS hardware and software systems. Design and develop modular, scalable payloads to support				

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206761F / <i>Protected Tactical Service (PTS)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>hosted or free-flyer configurations. Demonstrate prototype payload performance on-orbit. Evaluate PTS concept of operations with user participation and enable potential residual operational capability. Mature and validate user requirements. Continue prototyping and risk reduction efforts.</p> <p><b><i>FY 2020 Plans:</i></b> Award up to four competitive prototyping contracts or agreements to ensure robust competition from SATCOM providers for the rapid prototyping of the PTS System. Work with up to four contractors to begin prototyping of the PTS Space Segment. Conduct design work and reviews in support of prototype development. Begin system software development. Develop engineering design models. Develop and purchase hardware to support demonstration of early prototype deliveries. Conduct sub-system prototyping such as antenna suites and space processor. Model system architectures and conduct trade studies. Develop and mature system requirements. Initiate planning and design of Space Segment interfaces between the Ground and Gateway Segments of the PTS System. Begin development of the Ground and Gateway Segment. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p><b><i>FY 2021 Plans:</i></b> N/A</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> N/A</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	28.754	163.694	0.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

The PTS team utilizes the FY 2016 National Defense Authorization Act Section 804 guidance for Rapid Prototyping/Rapid Fielding and Section 815 OTA guidance in developing the acquisition strategy. This strategy places an emphasis on the rapid prototyping, production, and incremental iteration of PTS capability. This strategy takes the form of a series of successively honed and tailored spirals, focusing on payload development and hosting opportunities and incorporating lessons learned from Milstar, Enhanced Polar System (EPS), EPS-Recapitalization, Advanced Extremely High Frequency, PTES, and commercial SATCOM practices.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206761F / <i>Protected Tactical Service (PTS)</i>	<b>Project (Number/Name)</b> 643728 / <i>Protected Tactical SATCOM</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Protected Tactical SATCOM Rapid Prototyping (up to four contractors)	C/TBD	TBD : TBD	-	-		113.959	Nov 2019	0.000		-		0.000	0.000	113.959	-
Space Hub End Cryptographic Unit (ECU)	C/CPIF	L3Harris East : Camden, NJ	-	10.911	Jun 2019	21.020	Jan 2020	0.000		-		0.000	0.000	31.931	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	3.782	Nov 2018	6.759	Nov 2019	0.000		-		0.000	0.000	10.541	-
Enterprise SE&I	Various	Various : Various	-	11.007	Jan 2019	9.930	Jan 2020	0.000		-		0.000	0.000	20.937	-
<b>Subtotal</b>			-	25.700		151.668		0.000		-		0.000	0.000	177.368	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	MIPR	Aerospace : El Segundo, CA	-	1.387	Nov 2018	1.267	Nov 2019	0.000		-		0.000	0.000	2.654	-
Other Support	Various	Various : Various	-	0.061	Nov 2018	0.100	Nov 2019	0.000		-		0.000	0.000	0.161	-
A&AS	Various	Various : Various	-	1.606	Jan 2019	10.659	Nov 2019	0.000		-		0.000	0.000	12.265	-
<b>Subtotal</b>			-	3.054		12.026		0.000		-		0.000	0.000	15.080	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		-	28.754	163.694	0.000	-	0.000	192.448	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 4		<b>R-1 Program Element (Number/Name)</b> PE 1206761F / <i>Protected Tactical Service (PTS)</i>		<b>Project (Number/Name)</b> 643728 / <i>Protected Tactical SATCOM</i>	

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Hostable Protected Tactical PL</b>																												
Technical Baseline Management and Integration																												
Acquisition Strategy Development and Source Selection																												
Risk Reduction and Prototyping Concept Development (Includes SpEC OT)																												
Space Hub End Cryptographic Unit (ECU)																												
Space Hub ECU System Functional Requirements Review																												
Rapid Prototyping Spiral Contract/Agreement Award (up to four contractors)																												
Space Hub ECU Preliminary Design Review (PDR)																												
Rapid Prototyping Spiral PTS System Prototype Design & Development																												
Ground and Gateway Segments																												
Gateway Segment Authority to Proceed																												
Space Hub ECU Critical Design Review (CDR)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206761F / <i>Protected Tactical Service (PTS)</i>	<b>Project (Number/Name)</b> 643728 / <i>Protected Tactical SATCOM</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Hostable Protected Tactical PL</i></b>				
Technical Baseline Management and Integration	1	2019	4	2020
Acquisition Strategy Development and Source Selection	1	2019	2	2020
Risk Reduction and Prototyping Concept Development (Includes SpEC OT)	1	2019	2	2020
Space Hub End Cryptographic Unit (ECU)	3	2019	4	2020
Space Hub ECU System Functional Requirements Review	4	2019	4	2019
Rapid Prototyping Spiral Contract/Agreement Award (up to four contractors)	1	2020	1	2020
Space Hub ECU Preliminary Design Review (PDR)	2	2020	2	2020
Rapid Prototyping Spiral PTS System Prototype Design & Development	1	2020	4	2020
Ground and Gateway Segments	2	2020	4	2020
Gateway Segment Authority to Proceed	3	2020	3	2020
Space Hub ECU Critical Design Review (CDR)	3	2020	3	2020

**Note**

SpEC OT: Space Enterprise Consortium Other Transaction

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>					<b>R-1 Program Element (Number/Name)</b> PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	28.498	167.206	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	195.704
643725: <i>Evolved Strategic SATCOM (ESS)</i>	-	28.498	167.206	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	195.704
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206855F, Evolved Strategic SATCOM (ESS) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206855SF, Evolved Strategic SATCOM (ESS) from Appropriation 3600, Budget Activity 04 due to creation of a new Appropriation for Space Force.

The ESS system continues the strategic SATCOM mission of the Advanced Extremely High Frequency (AEHF) program by providing space and mission control segments for worldwide and arctic DoD strategic, secure, jam-resistant, survivable communications for ground, sea, and air assets. ESS will meet the requirements for strategic communications and capability gaps identified in the Protected Satellite Communications Services (PSCS) Analysis of Alternatives (AoA), the Protected Follow-on for Resiliency (PAFR) Study and the Strategic Tiger Team. The ESS architecture and functionality will be designed in accordance with the United States Strategic Command's signed ESS Concept of Operations and the Joint Requirements Oversight Council's validated Capability Development Document (CDD) satisfying the legacy AEHF strategic requirements and mission performance with enhancements for increased resiliency and cybersecurity.

ESS will support strategic mission requirements to provide the National Command Authority (NCA) and Combatant Commanders with highly-reliable, secure Military Satellite Communications. ESS will support the forecasted strategic demand in all operational environments and will be compatible with the existing architectures. The ESS system will satisfy emerging requirements using modular open system approaches to support incremental enhancements.

For more rapid and resilient strategic capability risk reduction, the ESS Program Office is executing its approved Space Segment acquisition strategy that leverages Middle Tier Acquisition authorities from the National Defense Authorization Act of 2016 for rapid prototyping, while maintaining the continuity of the AEHF strategic mission that interfaces operationally within the existing architecture.

Activities for the ESS ground segment acquisition includes evolving and enhancing existing ground segment, space-to-ground segment integration, and modernization in support of Enterprise Ground Services compatibility, in accordance with the acquisition strategies and schedules.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver ESS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	29.229	172.206	206.247	0.000	206.247
Current President's Budget	28.498	167.206	0.000	0.000	0.000
Total Adjustments	-0.731	-5.000	-206.247	0.000	-206.247
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-5.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.731	0.000			
• Other Adjustments	0.000	0.000	-206.247	0.000	-206.247

**Change Summary Explanation**

FY 2020: -\$5.0M Congressional Directed Reduction for unjustified increase.

FY 2021: Funds were transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Technical Baseline and Architectural Engineering	14.249	0.000	0.000
<b>Description:</b> The PSCS AoA, PAFR study, and Space Enterprise Vision study further defined the need for a more resilient, protected space architecture. ESS will support the strategic demand in all operational environments. Develop the technical baseline and conduct architectural engineering. Protected Tactical Waveform accommodation is not included in the current ESS CDD.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b>			



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A				
<b>Title:</b> Acquisition Strategy and Space Segment Prototyping Preparation Activities		8.549	4.278	0.000
<b>Description:</b> In accordance with concept and architecture studies, ESS is conducting market research and working with Air Force Space Command (AFSPC) to define system requirements in support of acquisition strategy development. Increase in program office support for developing documentation and planning for activities leading up to and including a draft and final Request for Proposal (RFP) release and source selection. Finalize space segment acquisition activities for rapid, competitive prototyping with capability demonstration for up to three contractors leading up to, but not including, contract awards.				
<b>FY 2020 Plans:</b> Includes changes due to updated Middle Tier Acquisition approach and re-alignment of activities. Finalize space segment acquisition efforts in support of prototyping and capability demonstration. Plan for the Space Segment End Cryptographic Unit (ECU) Request for Proposal, source selection, and contract award. Activities include, but not limited to: Continued engagements with potential space contractors; technical evaluations; contractor selections and negotiations; and other activities leading to, but not including, prototyping contract awards. Plan and provide any program office support, government-furnished equipment, studies or technical analyses, information or resources in support of prototyping activities. Federally Funded Research Development Center (FFRDC) and University Affiliated Research Center (UARC) studies and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, prototyping strategy, and ESS testing assets.				
<b>FY 2021 Plans:</b> N/A				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A				
<b>Title:</b> Space Segment Prototyping		0.000	142.233	0.000
<b>Description:</b> Award up to three competitive rapid-prototyping contracts. Invest in technology and demonstrations that enables continued development of modernized, strategic payload and other key technology prototypes, risk reduction, and space segment design. Enables long-term return on investment and energizes industrial base for Strategic SATCOM, increased competition, promotion of innovation, and increased resiliency. Actively manage contractors through prototyping, demonstration and requirements/criteria needed for contractors to competitively bid on the ESS space segment Build, Integration and Test (I&T) and Delivery follow-on.				

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b><i>FY 2020 Plans:</i></b> Execute all efforts related to the design, development and build of components for early integrated testing of prototypes for up to three contractors. Efforts for each contract may include, but are not limited to, long-lead parts planning and purchase, procurement of contractor and government provided test equipment, manufacturing prototypes, and manpower ramp-up. Includes all required cryptography, cyber and resiliency support for each contract and Government contractor support for oversight and integration of up to three contracts. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc. FFRDC and UARC studies and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, prototyping strategy, and ESS testing assets.</p> <p><b><i>FY 2021 Plans:</i></b> N/A</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> N/A</p>				
<p><b><i>Title:</i></b> ESS Ground Segment and Space-to-Ground Integration</p> <p><b><i>Description:</i></b> Develop and field the ESS ground segment, to include Mission Planning, Command and Control and other architecture and activities required to support the ESS space segment. Includes interoperability with the existing architectures and interfaces for EGS compatibility. Provide for space-to-ground (system) and mission integration for the ESS system.</p> <p><b><i>FY 2020 Plans:</i></b> Includes changes due to updated Middle Tier Acquisition approach and re-alignment of activities. Begin ground segment Phase 1 of up to five Broad Agency Announcement contracts for Mission Planning technology readiness and continue other acquisition activities in support of the ground segment and space-to-ground integration in accordance with the approved ESS Acquisition Strategy and schedule. Includes all program office and its contractor support for: Industry engagement; technical analysis/ studies; RFP documentation preparation; technical evaluations; and contract awards. Plan and provide any government-furnished equipment or resources in support of future fielding and testing of ESS. Includes all required cryptography, cyber and resiliency activities required and Government contractor support for management and oversight. FFRDC and UARC studies and technical support will assist with requirements trades, technical approaches, threat assessment and mitigation approaches, prototyping strategy, and ESS testing assets.</p> <p><b><i>FY 2021 Plans:</i></b> N/A</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b></p>		5.700	20.695	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A.			
<b>Accomplishments/Planned Programs Subtotals</b>	28.498	167.206	0.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

The Milestone Decision Authority (MDA) designated ESS Space Segment as an FY 2016 National Defense Authorization Act Middle Tier Acquisition (Rapid Prototyping) activity and approved the ESS acquisition strategy on 14 December 2018. A rapid prototyping phase effectively replaces the Technology Maturation and Risk Reduction phase from a traditional acquisition under Department of Defense 5000 series Directives and Instructions. This approach will award up to three contracts in FY2020 to focus on reducing space segment risks with the objective of maximizing ESS demonstrated capability for the payload and other key technologies. An ESS Program Office-led RFP and source selection will determine which space prototyping contractor, via their performance during the rapid prototyping phase, is positioned for the space segment Build, I&T and Delivery follow-on. The space prototyping contractors will be carried through the follow-on (Build, I&T and Delivery) source selection to continue momentum until the follow-on contract is awarded.

Return on investment from space prototyping will energize the industrial base and increase competition in strategic SATCOM; inject innovative technical, process and integration approaches; burn down risk early and identify/correct issues as early as possible; and decrease traditional fielding timelines to support a more resilient and responsive architecture against emerging threats. Success in the competitive rapid-prototyping determines and informs follow-on Build, I&T and Delivery.

The initial Ground Segment Acquisition Strategy was approved by the Program Executive Officer (PEO) in 4th Quarter FY 2019 to begin early technology readiness studies for ESS Phase 1 Mission Planning in FY 2020. Final approval for Mission Planning to begin architectural design and development/production may require additional approval and authority designation by the MDA. In-Band and Out-of-Band Command and Control studies are underway to best evolve these systems that are currently under sustainment.

A Space Segment Payload ECU acquisition strategy will be delivered to the PEO for approval in FY 2020.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206855F / Evolved Strategic SATCOM (ESS)	<b>Project (Number/Name)</b> 643725 / Evolved Strategic SATCOM (ESS)
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Space Segment Prototyping	C/TBD	TBD : TBD	-	-		112.335	Sep 2020	0.000		-		0.000	0.000	112.335	-
Ground Segment and Space-to-Ground Integration	TBD	TBD : TBD	-	2.058	Feb 2019	18.606	Nov 2019	0.000		-		0.000	0.000	20.664	-
Requirement Definition	Various	Various : Various	-	4.412	Nov 2018	-		-		-		-	0.000	4.412	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	4.419	Nov 2018	7.069	Nov 2019	0.000		-		0.000	0.000	11.488	-
Enterprise SE&I	C/CPAF	Linquest : Los Angeles, CA	-	11.608	Nov 2018	13.949	Nov 2019	0.000		-		0.000	0.000	25.557	-
<b>Subtotal</b>			-	22.497		151.959		0.000		-		0.000	0.000	174.456	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	Various	Various : Various	-	5.420	Nov 2018	4.533	Nov 2019	0.000		-		0.000	0.000	9.953	-
Other Support	Various	Various : Various	-	0.106	Oct 2018	0.400	Oct 2019	0.000		-		0.000	0.000	0.506	-
A&AS	Various	Various : Various	-	0.475	Nov 2018	10.314	Nov 2019	0.000		-		0.000	0.000	10.789	-
<b>Subtotal</b>			-	6.001		15.247		0.000		-		0.000	0.000	21.248	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		-	28.498	167.206	0.000	-	0.000	195.704	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>	<b>Project (Number/Name)</b> 643725 / <i>Evolved Strategic SATCOM (ESS)</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>ESS Development</b>	
System and Mission Integration	
Space Segment Prototyping - Planning	
Space Segment Prototyping - Contract Awards (up to 3 contractors)	
Space Segment Prototyping - Execution (up to 3 contractors)	
Ground Segment - In and Out-of-Band Command and Control efforts	
Ground Segment - Phase 1 Mission Planning Technology Readiness	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>	<b>Project (Number/Name)</b> 643725 / <i>Evolved Strategic SATCOM (ESS)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>ESS Development</i></b>				
System and Mission Integration	1	2019	4	2020
Space Segment Prototyping - Planning	1	2019	3	2020
Space Segment Prototyping - Contract Awards (up to 3 contractors)	4	2020	4	2020
Space Segment Prototyping - Execution (up to 3 contractors)	4	2020	4	2020
Ground Segment - In and Out-of-Band Command and Control efforts	2	2019	4	2020
Ground Segment - Phase 1 Mission Planning Technology Readiness	1	2020	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206857F / <i>Space Rapid Capabilities Office</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	288.289	26.885	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
64A020: <i>AF Funded ORSSats</i>	-	288.289	26.885	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
PE 1206857F, Space Rapid Capabilities Office, changed from Operationally Responsive Space

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206857F, Space Rapid Capabilities Office efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206857SF, Space Rapid Capabilities Office from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

The Space Rapid Capabilities Office (Space RCO) mission is to expedite the development and fielding of operationally focused capabilities for immediate and near-term needs as directed by the Space RCO Board of Directors (BoD). Key operating principles include a short and narrow chain of command, overarching programmatic insight, early and prominent war fighter involvement, and small integrated teams within a single office to rapidly augment existing space capabilities when needed, to expand operational capability, reconstitute/replenish/protect critical space capabilities to reserve "continuity of operations" capability, and exploit space technological or operational innovations to increase U.S. advantage.

The Space RCO is ready to develop, test, train, and equip war fighter needs as they are identified at any time. First, the requirements must be validated by the commander, USSTRATCOM, acting through U.S. Space Command; second, the project must be approved by the Space RCO BoD; third, the project will be executed by the Space RCO. If the effort is initiated during execution year, it will be described in the next year's budget exhibit.

Space RCO is supporting the Air Force Research Lab (AFRL) developed Space Solar Power project to collect solar energy and provide uninterrupted, assured, and logistically agile power to expeditionary forces operating in unimproved areas such as forward operating bases. AFRL formulated the Space Solar Power Incremental Demonstrations and Research (SSPIDR) project to rapidly demonstrate this innovative technology via a series of Integrated Demos and Technology Development/Maturation efforts.

Space RCO is supporting Special Operations Forces-Space (SOF-Space) for Joint Special Operations Command (JSOC) until it's transferred to JSOC in FY 2021. SOF developments include visionary, tailored, and future Space/Cyber projects as well as to plan, develop, test and transition advanced technologies into space system prototypes and capabilities to meet known and emerging threats. Conduct architecture studies, modeling and simulation, technical development, integration and test activities in preparation for transition of critical technologies into prototype or space program of record.

In addition, Space RCO will conduct studies and analysis for future programs to support the BoD.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206857F / <i>Space Rapid Capabilities Office</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver Space RCO weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	298.445	51.627	35.929	0.000	35.929
Current President's Budget	288.289	26.885	0.000	0.000	0.000
Total Adjustments	-10.156	-24.742	-35.929	0.000	-35.929
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-24.742			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-10.156	0.000			
• Other Adjustments	0.000	0.000	-35.929	0.000	-35.929

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 64A020: *AF Funded ORSSats*

Congressional Add: *Blackjack*

Congressional Add Subtotals for Project: 64A020

Congressional Add Totals for all Projects

	<b>FY 2019</b>	<b>FY 2020</b>
	24.112	-
	24.112	-
	24.112	-

**Change Summary Explanation**

FY2020: -\$24.742M congressional reduction due to termination of ORS-8 Program

FY2021: Funds were transferred from RDT&E, Air Force to RDT&E, Space Force.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Space RCO Solar Power	160.977	0.000	0.000
<b>Description:</b> Space RCO is developing the Solar Power project to collect solar energy and provide uninterrupted, assured, and logistically agile power to expeditionary forces operating in unimproved areas such as forward operating bases.			



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206857F / <i>Space Rapid Capabilities Office</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>				
<p><b>Title:</b> Space RCO Board of Directors (BoD) Projects, Studies, and Analysis</p> <p><b>Description:</b> Execute projects, studies, and analysis under rapid acquisition authorities inherent to the Space RCO, that address emergent capabilities and respond to validated requirements and other BoD approved efforts to meet needs in year of execution. In addition, provide systems engineering, program management support and civilian pay across all the Space RCO activities as well as perform modeling, simulation, analysis, and assess alternative concepts and requirements.</p> <p><b>FY 2020 Plans:</b> Continue to initiate rapid acquisition projects, studies, and analysis that address emergent capabilities requirements and other Space RCO BoD approved efforts to meet warfighter needs. These activities may include, but are not limited to studies, technical analysis, experimentation, prototyping, modeling, etc. Continue ongoing systems engineering support of future mission development as well as Program Office support and potentially including Civilian pay. Activities may include, but are not limited to program office support, facilities, and studies. This Major Thrust includes items formerly under Operational Capabilities, Development, Enablers, Integration and Rapid Assembly, Integration &amp; Test as well as Space RCO Development for FY 2020.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>		16.405	9.000	0.000
<p><b>Title:</b> Support EO/IR Weather Systems</p> <p><b>Description:</b> Rapidly exploit and infuse space technological and operational innovations to increase U.S. advantage.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b></p>		74.400	0.000	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206857F / <i>Space Rapid Capabilities Office</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A				
<b>Title:</b> Space Related Tactical Communications and Cyber Enhancements for SOF		12.395	17.885	0.000
<b>Description:</b> Provides enhanced communication and cyber capabilities to support tactical operations by Quick Reaction Forces (QRF) and Special Operations Forces (SOF).				
<b>FY 2020 Plans:</b>				
- ARAGORN - Extends limited comm capability in forward locations				
- IC CHAT - PKI capability for network chatting for deployed users with limited comm				
- Ka Band AIRCRAFT GEOLOCATION (KAG) - Improving SATCOM tracking and locating of enemy asset				
- EW SENSOR INTEGRATION (EWSI) - Adds additional customer sensors to JICD 4.2 fabric				
- AVALON - Determine feasibility of space-enabled cyber operations capability generation				
- CASIO - Improving geolocation capabilities for sensors and merged into COTS radios				
- SIDEWINDER - BANK of DETECTORS - Providing integration of deployed sensors into an operational architecture				
- Advanced TTL Handsets - Enabling operators to efficiently communicate regarding sensitive operations				
- Denied GPS Capabilities - Providing backup capability in GPS-denied areas				
- Friendly Force Tracking (FFT) Ground equipment - Create newer FFT devices needed to accept covert waveforms				
<b>FY 2021 Plans:</b> N/A				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>				

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206857F / <i>Space Rapid Capabilities Office</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	264.177	26.885	0.000

	FY 2019	FY 2020
<b>Congressional Add:</b> Blackjack	24.112	-
<b>FY 2019 Accomplishments:</b> Blackjack objectives are to demonstrate the military utility of lower cost payloads, leverage commercial architectures, and demonstrate on-orbit data processing and autonomy. Funds are being used to support DARPA in developing payload concepts to Preliminary Design Review, understanding of commercial networks, and initial ground capabilities.		
<b>Congressional Adds Subtotals</b>	24.112	-

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
Expediently award contracts through Space RCO or partner organizations.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206857F / <i>Space Rapid Capabilities Office</i>	<b>Project (Number/Name)</b> 64A020 / <i>AF Funded ORSSats</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Space RCO Solar Power	SS/CPFF	Northrop Grumman : Linthicum, MD	-	160.977	Jun 2019	-		-		-		-	Continuing	Continuing	-
Support EO/IR Weather	TBD	TBD : TBD	-	74.400	Sep 2019	-		-		-		-	Continuing	Continuing	-
Space RCO Board of Directors (BoD) Projects, Studies, and Analysis	TBD	Various : Various	-	7.357	Sep 2019	2.577	Mar 2020	-		-		-	Continuing	Continuing	-
Space Related Tactical Communications and Cyber Enhancements for SOF	C/TBD	Various : Various	-	12.395	Jul 2019	17.885	Jul 2020	-		-		-	0.000	30.280	30.280
Blackjack	MIPR	DARPA : Various	-	24.112	Jan 2019	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	279.241		20.462		-		-		-	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS	Various	Various : Various	-	4.111	Dec 2018	0.898	Dec 2019	-		-		-	Continuing	Continuing	-
FFRDC	Various	Various : Various	-	4.937	Dec 2018	5.525	Dec 2019	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	9.048		6.423		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		-	288.289	26.885	-	-	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206857F / <i>Space Rapid Capabilities Office</i>	<b>Project (Number/Name)</b> 64A020 / <i>AF Funded ORSSats</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Space Rapid Capabilities Office</b>	
Space RCO Solar Power	
Space RCO Board of Directors (BoD) Projects, Studies, and Analysis	
Blackjack	
Support EO/IR Weather Systems	
Space Related Tactical Communications and Cyber Enhancements for SOF	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206857F / <i>Space Rapid Capabilities Office</i>	<b>Project (Number/Name)</b> 64A020 / <i>AF Funded ORSSats</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Space Rapid Capabilities Office</b>				
Space RCO Solar Power	1	2019	4	2023
Space RCO Board of Directors (BoD) Projects, Studies, and Analysis	2	2019	4	2025
Blackjack	2	2019	4	2019
Support EO/IR Weather Systems	2	2019	4	2019
Space Related Tactical Communications and Cyber Enhancements for SOF	3	2019	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604200F / <i>Future Advanced Weapon Analysis &amp; Programs</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.262	5.000	25.161	0.000	25.161	46.330	0.000	0.000	0.000	0.000	76.753
653133: <i>Armament Subsystems</i>	-	0.262	5.000	25.161	0.000	25.161	46.330	0.000	0.000	0.000	0.000	76.753
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This program provides a responsive design and development engineering infrastructure to address emerging issues and technology insertion/technology application on legacy systems, and supports analysis to develop new capability systems, improve legacy systems, or determine feasibility of utilizing prototypes with advanced technology on fielded systems. Efforts will identify methods to improve system performance, develop potential future designs, mitigate evolving threats, reduce life cycle costs, develop/expand modeling/simulation and experimental platforms for weapon qualification activities, improve safety, and ensure both viability and durability of tactical missile systems. Results enable highly informed decisions on acquisition initiatives to develop, refine, and rapidly integrate emerging technologies into new weapons concepts or existing aircraft munitions which include, but are not limited to, multi-role missile development, advanced long-range weapons capabilities, advanced propulsion systems technologies, non-kinetic and directed energy technologies, warheads, fuzes, and tailkits to address warfighter, Air Staff and OSD initiatives and strategies.

In order to accomplish the above objectives, this program may accomplish pre-acquisition planning and systems engineering, risk reducing prototype missile design work, aircraft integration, prototype ground & flight tests, pre-planning and execution of Joint Capability Technology Demonstrations (JCTD), development and prototyping of threat emulations, simulations, presentation of evolving threat scenarios, target area environments to prepare for emerging weapons development activities, and program management support.

Finally, this program also conducts high fidelity Modeling, Simulation and Analysis (MS&A) to support the development, testing and evaluating of future concept and legacy weapons. The MS&A work includes physics-level, engineering-level, and engagement/mission-level modeling simulation and analysis.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Future Advanced Weapon Systems capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604200F / <i>Future Advanced Weapon Analysis &amp; Programs</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	39.602	246.200	169.400	0.000	169.400
Current President's Budget	0.262	5.000	25.161	0.000	25.161
Total Adjustments	-39.340	-241.200	-144.239	0.000	-144.239
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-241.200			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-37.963	0.000			
• SBIR/STTR Transfer	-1.377	0.000			
• Other Adjustments	0.000	0.000	-144.239	0.000	-144.239
 <b>Change Summary Explanation</b>					
FY 2019 reduction of \$37.963 for higher Air Force Priorities due to Extended Range Weapon (ERWn) termination					
FY 2019 reduction of \$1.377M for SBIR					
FY 2020 reduction of \$241.200 for Congressional Directed Reduction due to ERWn termination					
FY 2021 reduction of \$144.239 for higher Air Force Priorities due to ERWn termination					

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Capability Development</p> <p><b>Description:</b> Plan and execute early Systems Engineering, concept studies, trade space analyses, modeling &amp; simulation, portfolio acquisition planning, agile acquisition strategies, and risk reduction activities for future advanced weapon systems to defeat evolving threat scenarios and environments. Provides security, temporary work space/seating, and information technology capabilities to support mission needs.</p> <p><b>FY 2020 Plans:</b> Collaborate with Next Generation Munitions Cross Functional Team (CFT) to define operational context for Affordable Mass Weapons and outline connectivity between acquisition paths and the transition of critical enabling technologies. Collaborate with Navy on future weapon initiatives. Support Next Gen Munitions CFT development of Air-to-Air Weapons Roadmap. Conduct engagement level trade space analyses and initial acquisition strategies for Defensive Weapons. Enable recurring engagements with AFRL to strategize future acquisition of directed energy weapons.</p> <p><b>FY 2021 Plans:</b> Complete requirements definition via concept studies, engagement level analyses, and develop initial acquisition strategies for Affordable Mass Weapons. Complete engagement-level and begin mission-level trade space analyses for Defensive Weapons.</p>	0.262	2.000	8.750



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604200F <i>I Future Advanced Weapon Analysis &amp; Programs</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Incorporate Weapon Open System Architecture development and digital engineering into Affordable Mass, Defensive Weapons, and future air-to-air weapon concept studies and acquisition planning. Continue directed energy and non-kinetic technology transition activities. Begin pre-acquisition and systems engineering activities of future air-breathing hypersonic weapons.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased due to starting concept studies in FY21</p>				
<p><b>Title:</b> Rapid Prototyping</p> <p><b>Description:</b> Conduct rapid acquisition/prototyping efforts and Modeling, Simulation, and Analysis (MS&amp;A) validated through integration of empirical data derived from prototypes and demonstrations.</p> <p><b>FY 2020 Plans:</b> Establish Memorandums of Agreement between government agencies and outline test plan for Phase I (telemetry) and II (live warhead) demo of a defensive weapon. Establish Cooperative Research &amp; Development Agreement with industry for flight test of a baseline Affordable Mass Weapon concept. Fund government agencies to provide test planning and aircraft integration support of prototype vehicle developed under industry Independent Research &amp; Development (IRAD).</p> <p><b>FY 2021 Plans:</b> Acquire and modify test assets for demo of a defensive weapon. Conduct Phase I flight test and analysis of a defensive weapon. Complete Phase II test design and planning. Design and flight test a derivative prototype of an Affordable Mass Weapon concept for a second mission using digital engineering.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased due to acquisition of test assets and conducting flight test in FY21.</p>		-	2.000	15.000
<p><b>Title:</b> Digital Foundation</p> <p><b>Description:</b> Provides model-based systems engineering, modeling &amp; simulation, data analysis tool suites, and associated software engineering expertise to support weapons capability development and rapid prototyping.</p> <p><b>FY 2020 Plans:</b> Develop weapons analysis repository database. Maintain trade space analysis framework. Develop model-based systems engineering concept development framework. Develop weapon survivability modeling capability and maritime lethality analysis capability.</p> <p><b>FY 2021 Plans:</b></p>		0.000	0.500	0.911

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604200F / <i>Future Advanced Weapon Analysis &amp; Programs</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Maintain weapons analysis repository database. Update trade space analysis framework to enable online collaboration with other government agencies. Employ newly developed digital foundation to support weapon capability development. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased to support additional framework capacity and modeling capabilities.				
<b>Title:</b> Industry Connectivity <b>Description:</b> Enables Air Force outreach to small and large businesses to solicit innovative material solutions for future weapon initiatives. <b>FY 2020 Plans:</b> Conduct annual Weapons Industry Day / Armament Futures workshop. Provide support to the Agile Acquisition Consortium's annual classified Threat Day. Establish Weapons Pitch Days for small and large businesses. Establish Innovation Event following the AF Armament Futures workshop to invigorate rapid next generation weapon solutions. <b>FY 2021 Plans:</b> Conduct annual AF Armament Futures Workshop, Innovation Event, Threat Day, and Pitch Days for small and large businesses. Develop future agendas based on participant feedback and informed by capability development weapons roadmap activities. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A		-	0.500	0.500
<b>Accomplishments/Planned Programs Subtotals</b>		0.262	5.000	25.161
<b>D. Other Program Funding Summary (\$ in Millions)</b> N/A				
<b>Remarks</b>				
<b>E. Acquisition Strategy</b> Accomplish studies, analyses, concept development and engineering; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved.				

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604200F / <i>Future Advanced Weapon Analysis &amp; Programs</i>	<b>Project (Number/Name)</b> 653133 / <i>Armament Subsystems</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Directed Energy Studies	MIPR	AFRL : Various	-	-		1.250	Jul 2020	3.530	Jul 2021	-		3.530	0.000	4.780	-
Prototype Vehicle Development & Integration	C/Various	AFLCMC/EB : Eglin AFB, FL	-	-		1.480	May 2020	10.250	Mar 2021	-		10.250	0.000	11.730	-
Affordable Mass Studies	C/TBD	TBD : TBD	-	-		0.250	Jul 2020	4.040	Jul 2021	-		4.040	0.000	4.290	-
<b>Subtotal</b>			-	-		2.980		17.820		-		17.820	0.000	20.800	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Systems Engineering & Studies Support	C/Various	AFLCMC/EB : Eglin AFB, FL	-	0.079	Feb 2020	0.536	Jun 2020	2.144	Jun 2021	-		2.144	0.000	2.759	-
Modeling & Simulation Licenses & Support	C/Various	AFLCMC/EB : Eglin AFB, FL	-	-		0.500	May 2020	0.911	May 2021	-		0.911	0.000	1.411	-
<b>Subtotal</b>			-	0.079		1.036		3.055		-		3.055	0.000	4.170	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Test and Evaluation	MIPR	Various : Various	-	-		0.216	Nov 2020	2.750	Apr 2021	-		2.750	0.000	2.966	-
<b>Subtotal</b>			-	-		0.216		2.750		-		2.750	0.000	2.966	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration	Various	Various : Eglin AFB, FL	-	0.183	Sep 2019	0.768	Dec 2019	1.536	Dec 2020	-		1.536	0.000	2.487	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604200F / <i>Future Advanced Weapon Analysis &amp; Programs</i>	<b>Project (Number/Name)</b> 653133 / <i>Armament Subsystems</i>
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
<b>Subtotal</b>			-	0.183		0.768		1.536		-		1.536	0.000	2.487	N/A

**Remarks**  
Includes A&AS contract, IT requirements, travel, and office supplies.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	0.262	5.000	25.161	-	25.161	0.000	30.423	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>			<b>Date: February 2020</b>
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604200F / <i>Future Advanced Weapon Analysis &amp; Programs</i>	<b>Project (Number/Name)</b> 653133 / <i>Armament Subsystems</i>	

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
<b>Capability Development</b>																																
Defensive Weapons Engagement Lvl Analysis																																
Defensive Weapons Mission Lvl Analysis																																
Directed Energy/Non-Kinetic Studies																																
Air-to-Air Roadmap Analysis of Alternatives																																
Affordable Mass Capabilities Based Assessment																																
Affordable Mass Engagement Lvl Analysis																																
Affordable Mass Concept Studies																																
Air-Breathing Hypersonics Pre-Acquisition Analysis																																
<b>Rapid Prototyping</b>																																
Defensive Weapon Prototyping & Demonstration																																
Affordable Mass Prototyping & Demonstration																																
Affordable Mass Open System Architecture Development Phase I																																
Affordable Mass Open System Architecture Development Phase II																																
<b>Digital Foundation</b>																																
Weapons Analysis Database & Framework																																
Models Based Systems Engr Framework																																
Weapons Survivability Modeling																																
Maritime Effects Lethality Modeling																																
<b>Industry Connectivity</b>																																

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604200F / <i>Future Advanced Weapon Analysis &amp; Programs</i>	<b>Project (Number/Name)</b> 653133 / <i>Armament Subsystems</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Futures Workshops, Pitch Days, Innovation Days	[REDACTED]																											
Threat Day Events	[REDACTED]																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604200F / <i>Future Advanced Weapon Analysis &amp; Programs</i>	<b>Project (Number/Name)</b> 653133 / <i>Armament Subsystems</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Capability Development</b>				
Defensive Weapons Engagement Lvl Analysis	3	2019	3	2020
Defensive Weapons Mission Lvl Analysis	4	2020	3	2021
Directed Energy/Non-Kinetic Studies	4	2020	4	2022
Air-to-Air Roadmap Analysis of Alternatives	3	2021	3	2022
Affordable Mass Capabilities Based Assessment	2	2020	3	2020
Affordable Mass Engagement Lvl Analysis	4	2021	3	2022
Affordable Mass Concept Studies	3	2021	4	2022
Air-Breathing Hypersonics Pre-Acquisition Analysis	2	2021	4	2022
<b>Rapid Prototyping</b>				
Defensive Weapon Prototyping & Demonstration	3	2020	3	2022
Affordable Mass Prototyping & Demonstration	4	2020	4	2022
Affordable Mass Open System Architecture Development Phase I	2	2021	4	2021
Affordable Mass Open System Architecture Development Phase II	1	2022	4	2022
<b>Digital Foundation</b>				
Weapons Analysis Database & Framework	1	2020	4	2022
Models Based Systems Engr Framework	3	2020	1	2021
Weapons Survivability Modeling	1	2021	4	2022
Maritime Effects Lethality Modeling	1	2021	2	2022
<b>Industry Connectivity</b>				
Futures Workshops, Pitch Days, Innovation Days	3	2020	3	2022
Threat Day Events	2	2020	2	2022

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	45.363	142.782	38.564	0.000	38.564	50.923	10.980	0.000	0.000	0.000	288.612
651030: <i>GPS Receiver Development</i>	-	45.363	142.782	38.564	0.000	38.564	50.923	10.980	0.000	0.000	0.000	288.612
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

Positioning, Navigation and Timing (PNT) solutions are critical to defense operations, enabling delivery of precision fires, safe aerial navigation, and time coordination across multiple platforms and subsystems. PNT must be maintained in the face of emerging and continuously evolving electronic and cyber threats, requiring increased system resiliency and rapid adaptability similar to that historically required of electronic warfare systems. Evolving threats will drive upgrades such as Global Positioning System (GPS) receiver modernization, development of standard navigational system formats/interfaces, increased use of open system architecture design principles, incorporation of alternative navigation sources into navigational solutions, advanced anti-jam antennas, antenna electronics, radio frequency monitoring/locating/reporting capabilities, and precision clock improvements to maintain current and future force capabilities.

Project 651030 includes Embedded GPS/Inertial Navigation System (INS) Modernized (EGI-M), Miniaturized Airborne GPS Receiver 2000 Modernization (MAGR-2K-M), Resilient EGI (R-EGI) development, anti-jam antenna/antenna electronics development, situational awareness devices and other advanced/non-GPS PNT solutions. Activities also include, but are not limited to, current program planning, rapid prototyping/concept development, execution and future program planning and support to other GPS enabled systems as required. The PNT Resiliency, Mods, and Improvements (RMI) effort provides rapidly reprogrammable application space for Alternate Satellite Navigation Systems User Equipment (UE), enabling agile and resilient response to GPS threat environments. Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortage (DMSMS) issues.

The FY 2021 funding request was reduced by \$6.364M to account for the availability of prior year execution balances.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver GPS receiver development capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	46.731	67.782	45.000	0.000	45.000
Current President's Budget	45.363	142.782	38.564	0.000	38.564
Total Adjustments	-1.368	75.000	-6.436	0.000	-6.436
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	75.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.368	0.000			
• Other Adjustments	0.000	0.000	-6.436	0.000	-6.436

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 651030: *GPS Receiver Development*

Congressional Add: *Program Increase - Embedded GPS/INS - Modernized (EGI-M)*

Congressional Add Subtotals for Project: 651030

Congressional Add Totals for all Projects

	<b>FY 2019</b>	<b>FY 2020</b>
	-	75.000
Congressional Add Subtotals for Project: 651030	-	75.000
Congressional Add Totals for all Projects	-	75.000

**Change Summary Explanation**

In FY 2019, decrease of \$1.368M for SBIR.

In FY 2020, Congressional Add for Unfunded requirement

In FY 2021, decrease of \$6.364M to account for the availability of prior year execution balances and decrease of \$0.072M for inflation adjustments.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Embedded GPS/INS - Modernized (EGI-M)	44.691	15.282	0.000
<b>Description:</b> EGI-M is a combined INS/GPS aircraft position, navigation, and timing system. Program upgrades EGI design to enhance resiliency against existing and emerging navigational warfare threats, incorporating design features (such as interface standardization and software modularity) to incorporate alternative navigation and timing sources, where cost effective, to reduce DoD cost and time lines to respond to newly identified threats and maintain current force capabilities. Incorporates M-Code and Automatic Dependent Surveillance-Broadcast (ADS-B) compliance capability into EGI receivers while addressing parts obsolescence, reducing configuration count from 260+ to a desired end-state of 16, and decreasing production and sustainment costs.			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>FY 2020 Plans:</b> Finalize baseline requirements for initial platforms in order to develop Prime Item Development Specification (PIDS) and Interface Control Document (ICD). Receive qualification test procedures approval to begin test &amp; evaluation (T&amp;E). Complete Critical Design Review (CDR) and begin the production engineering development models (EDM).</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased in conjunction with planned receiver development activities for all systems.</p>				
<p><b>Title:</b> Miniaturized Airborne GPS Receiver 2000 - Modernized (MAGR-2K-M)</p> <p><b>Description:</b> MAGR-2K-M is an aircraft GPS receiver. Program increases MAGR-2K-Legacy resiliency against existing and emerging navigational warfare threats while reducing cost and time lines to incorporate agile capabilities to respond to newly identified threats. Incorporates M-Code capability into MAGR-2K-Legacy receivers while addressing parts obsolescence and providing a pathway to ADS-B Out implementation. Performs appropriate trade studies and incorporates additional resiliency features, such as alternate navigation inputs, where cost effective. The Air Force and the Navy are the primary users of the MAGR-2K-M system.</p> <p><b>FY 2020 Plans:</b> Complete full qualification testing, Production Readiness Unit (PRU) integration and flight test support. Conduct anomaly resolution.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased in conjunction with planned receiver development activities for all systems.</p>		0.521	1.000	0.000
<p><b>Title:</b> PNT Resiliency, Mods, and Improvements (RMI)</p> <p><b>Description:</b> Conduct studies and analysis of PNT systems and requirements, develop and evaluate alternative courses of action, identify, plan and conduct PNT technology transition projects, conduct prototype and acquisition program planning, and provide recommended solutions to DoD and Air Force decision makers relative to navigation warfare threat evolution and technology emergence. This includes work for more flexible Secure Software Defined Receiver User Equipment to capture other than GPS signals like Multi-Global Navigation Satellite Systems to include Navigation Technology Satellite-III.</p>		0.121	0.500	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>FY 2020 Plans:</b> Develop M-code prototypes</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased in conjunction with planned development activities for all systems.</p>				
<p><b>Title:</b> Resilient EGI (R-EGI)</p> <p><b>Description:</b> Establishes a Government Reference Architecture (GRA) embodying open systems architecture concepts, enabling and accelerating the transition of future resilient PNT DoD systems. Enables design and development of various aircraft PNT Line Replaceable Units (LRUs) that are rapidly upgradeable to counter evolving threats. Demonstrates the GRA through prototyping of an open R-EGI LRU. Program matures, prototypes, and tests promising PNT technologies/systems and develops transition paths to flow new technologies into new and/or existing PNT systems. Provides improved PNT resiliency to counter navigational warfare threats through the design, development, test, and transition of science and technology efforts to PNT systems.</p> <p><b>FY 2020 Plans:</b> Continue the R-EGI LRU prototyping effort, fabricating, and testing initial proof-of-concept prototypes and beginning design on functional demonstration prototypes. Continue development of hardware standards and software navigation protocols, aircraft data/communication networking protocols and advanced receiver designs. Continue to mature resilient hardware and software technologies into new and/or existing PNT systems.</p> <p><b>FY 2021 Plans:</b> Converge Phase I R-EGI LRU prototypes into Phase II R-EGI LRU "Best of Breed" prototypes while refining fabrication, testing, and design on functional demonstration prototypes. Continue development of hardware standards and software navigation protocols, aircraft data/communication networking protocols and advanced receiver designs. Continue to mature resilient hardware and software technologies into new and/or existing PNT systems.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to the transition between phases of the R-EGI LRU prototyping effort and associated contractual implementations.</p>		0.030	51.000	38.564
<b>Accomplishments/Planned Programs Subtotals</b>		45.363	67.782	38.564

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>
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	FY 2019	FY 2020
<b>Congressional Add:</b> Program Increase - Embedded GPS/INS - Modernized (EGI-M)	-	75.000
<b>FY 2020 Plans:</b> EGI-M development, testing, and production engineering development models (EDM).		
<b>Congressional Adds Subtotals</b>	-	75.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

Modify and modernize existing legacy PNT systems to incorporate major enhancements such as GPS M-Code, ADS-B out, and alternative PNT solutions to GPS while reducing lifecycle costs through common sustainment practices and economies of scale. Design, development, and testing efforts, to include the development of government owned reference architectures for rapid capability insertion, share a common PE to allow flexibility in funding and planning. Integration and operational testing of completed PNT solutions are accomplished by individual platforms and weapons systems. This approach uses a combination of cost-plus and fixed-price contract types based on acquisition phase and risk with a mix between competition and sole-source strategies. Modifications to legacy receivers are acquired via Engineering Change Proposals (ECP)/Task Orders on existing contracts. Other Transaction Authorities (OTA) and industry consortiums are used to support prototyping and open standards development for new PNT solutions.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604201F / PNT Resiliency, Mods, and Improvements	<b>Project (Number/Name)</b> 651030 / GPS Receiver Development
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EGI-M #1 EMD	C/CPAF	Honeywell : Clearwater, FL	-	-		34.976	Apr 2020	-		-		-	Continuing	Continuing	-
EGI-M #2 EMD	SS/CPFF	Northrop Grumman : Woodland Hills, CA	-	40.276	Nov 2018	38.732	Mar 2020	-		-		-	Continuing	Continuing	-
MAGR-2K-M	SS/CPFF	Raytheon : El Segundo, CA	-	0.000	May 2019	1.000	Jul 2020	-		-		-	Continuing	Continuing	-
PNT RMI	SS/CPFF	Collins Aerospace : Des Moines, IA	-	0.121	Jul 2019	0.500	Oct 2019	-		-		-	Continuing	Continuing	-
R-EGI	C/CPFF	IS4S : Huntsville, AL	-	0.000	May 2019	51.000	Oct 2019	35.383	Oct 2020	-		35.383	Continuing	Continuing	-
<b>Subtotal</b>			-	40.397		126.208		35.383		-		35.383	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EGI-M FFRDC	Various	MITRE Corp. : Bedford, MA	-	1.142	Oct 2018	0.263	Oct 2019	-		-		-	Continuing	Continuing	-
R-EGI FFRDC	Various	MITRE Corp. : Bedford, MA	-	-		1.663	Oct 2019	1.925	Oct 2020	-		1.925	Continuing	Continuing	-
EGI-M Lab	PO	Integrated Spt Facility : GA	-	-		-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	1.142		1.926		1.925		-		1.925	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EGI-M	PO	Various : TBD	-	0.000	Mar 2019	0.500	Oct 2019	-		-		-	Continuing	Continuing	-
MAGR-2K-M	PO	Various : TBD	-	0.000	Mar 2019	0.400	Oct 2019	-		-		-	Continuing	Continuing	-
R-EGI	PO	Various : TBD	-	0.030		0.030	Oct 2019	0.500	Oct 2020	-		0.500	Continuing	Continuing	-



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604201F / PNT Resiliency, Mods, and Improvements	<b>Project (Number/Name)</b> 651030 / GPS Receiver Development

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>PNT</b>																												
EGI-M #1 EMD (NGC)																												
EGI-M #2 EMD (HI)																												
MAGR-2K-M EMD																												
MAGR-2K-M Testing																												
R-EGI Prototyping																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>	<b>Project (Number/Name)</b> 651030 / <i>GPS Receiver Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>PNT</i></b>				
EGI-M #1 EMD (NGC)	1	2019	1	2021
EGI-M #2 EMD (HI)	2	2020	1	2021
MAGR-2K-M EMD	1	2019	4	2020
MAGR-2K-M Testing	1	2019	4	2020
R-EGI Prototyping	4	2019	4	2023

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	4.311	4.406	35.033	0.000	35.033	32.108	27.202	26.928	25.525	Continuing	Continuing
654236: <i>Engineering Analysis</i>	-	2.822	2.421	4.458	0.000	4.458	5.402	5.097	4.412	2.579	Continuing	Continuing
654807: <i>Nuclear Weapon System Technology and Integration</i>	-	0.000	0.000	19.357	0.000	19.357	19.767	20.123	20.498	20.891	Continuing	Continuing
655708: <i>Nuclear Weapons Support</i>	-	1.489	1.985	11.218	0.000	11.218	6.939	1.982	2.018	2.055	Continuing	Continuing

**Note**

This program, BA 5, PE 0604222F, project 654807, Weapons Effects, is a new start.  
 This program, BA 5, PE 0604222F, project 654807, Air Force Nuclear Red Team (AFNRT), is a new start.  
 This program, BA 5, PE 0604222F, project 654807, Advanced Concepts Studies (ACS), is a new start.  
 This program, BA 5, PE 0604222F, project 654807, Nuclear Certification, is a new start.

**A. Mission Description and Budget Item Justification**

The Air Force Nuclear Weapons Center (AFNWC), Kirtland AFB, NM, is the primary executing agency for this program. AFNWC is tasked with maintaining and providing technical expertise on all AF nuclear weapons and weapon systems. This program provides resources for technical and programmatic activities which includes researching, developing and testing new nuclear-certified equipment/systems as well as performing independent analyses on all AF nuclear weapons systems activities including weapons development and sustainment; interoperability; compatibility; safety, security, and reliability; Air Force legacy nuclear stockpile management/retirement; nuclear certification and nuclear certification management.

In FY2021, PE 0104222F, (various projects listed above as New Starts) were transferred to PE 0604222F, Project 654807 (Nuclear Weapons System Technology and Integration), in order to more properly align these efforts with an RDT&E program element.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Nuclear Weapons Support and Integration capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F and 0605833F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	4.468	4.406	16.376	0.000	16.376
Current President's Budget	4.311	4.406	35.033	0.000	35.033
Total Adjustments	-0.157	0.000	18.657	0.000	18.657
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.157	0.000			
• Other Adjustments	0.000	0.000	18.657	0.000	18.657

**Change Summary Explanation**

FY21 increase due to existing activities moving from an O&M portfolio (0104222F) to this RDTE program element (project 654807).

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604222F / Nuclear Weapons Support				<b>Project (Number/Name)</b> 654236 / Engineering Analysis			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
654236: <i>Engineering Analysis</i>	-	2.822	2.421	4.458	0.000	4.458	5.402	5.097	4.412	2.579	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Air Force Nuclear Weapons Center is the executing agency for this program. The Air Force is tasked with maintaining and providing technical expertise on all AF nuclear weapons and weapon systems and conducting mission-level cyber risk analysis, integrating cybersecurity into systems engineering, enhancing adaptability and agility via modular design and approaches, developing a cyber-savvy workforce, increasing assurance in fielded systems in a cost effective and efficient manner, increasing the integration of cyber intelligence and enabling cyber operation flights and cyber protection teams. This program provides resources for technical and programmatic activities which includes performing independent analyses on all AF nuclear weapons systems activities including weapons development and sustainment; interoperability; compatibility; training; safety, security, and reliability; Air Force legacy nuclear stockpile management/retirement; nuclear certification and nuclear certification management. The AFNWC will partner with external agencies to achieve cross cutting solutions to mitigate cyber vulnerabilities. The development of Model Based System Engineering will facilitate the testing and analysis of nuclear weapons systems.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Engineering Analysis	2.822	2.421	4.458	0.000	4.458
<b>Description:</b> Provide the technical oversight of all Air Force (AF) nuclear weapons, delivery systems, and support systems. Provide the engineering and technical management expertise required in critical areas of nuclear weapons safety, security, reliability, operations, modernization, testing, certification, and counter proliferation.					
<b>FY 2020 Plans:</b> Continue to analyze and document nuclear weapons issues related to risk assessment, data collection, model development, model validation and verification, weapon effectiveness, and nuclear stockpile planning and requirements assessment.					
<b>FY 2021 Base Plans:</b> Increase analysis and documentation of nuclear weapons issues related to risk assessment, data collection, model development, model validation and verification, weapon effectiveness, and nuclear stockpile planning and requirements assessment.					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>					

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 654236 / <i>Engineering Analysis</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Increase efforts on cybersecurity vulnerability analyses and broaden the spectrum to include ground and aircraft systems.					
<b>Accomplishments/Planned Programs Subtotals</b>	2.822	2.421	4.458	0.000	4.458

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Cost Plus Award Fee (CPAF) and Military Interdepartmental Purchase Request (MIPR) will be used to obtain technical analyses and technical support for safety, operations, and counter proliferation assessments. Supporting activities are contracted separately using contract strategies deemed most appropriate to the effort. All contracts will be openly competed.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / Nuclear Weapons Support	<b>Project (Number/Name)</b> 654236 / Engineering Analysis
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Federally Funded Research and Development Center (FFRDC) Cybersecurity Vulnerability Analysis	MIPR	AEROSPACE : Kirtland AFB, NM	-	1.072	Aug 2019	0.292	Nov 2019	0.600	Nov 2020	-		0.600	Continuing	Continuing	-
FFRDC Emulation of the Strategic Missile Integration Complex (SMIC)	MIPR	AEROSPACE : Kirtland AFB, NM	-	1.170	Jun 2019	0.545	Feb 2020	1.200	Feb 2021	-		1.200	Continuing	Continuing	-
<b>Subtotal</b>			-	2.242		0.837		1.800		-		1.800	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Secure Cyber Facility Support	MIPR	Various : Kirtland AFB, NM	-	0.273	Feb 2019	0.227	Nov 2019	0.500	Nov 2020	-		0.500	0.000	1.000	-
Mission Support	MIPR	AEROSPACE : Kirtland AFB, NM	-	0.227	Oct 2019	0.629	Feb 2020	0.900	Feb 2021	-		0.900	0.000	1.756	-
Model Based Systems Engineering (MBSE)	Reqn	Not specified. : Kirtland AFB, NM	-	-		0.128	Feb 2020	0.458	Feb 2021	-		0.458	Continuing	Continuing	-
<b>Subtotal</b>			-	0.500		0.984		1.858		-		1.858	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EZ A&AS	Various	Various : Kirtland AFB, NM	-	0.049	Aug 2019	0.431	Feb 2020	0.600	Feb 2021	-		0.600	Continuing	Continuing	-
Program Management Support (PMA)	Various	Various : Kirtland AFB, NM	-	0.031	Oct 2018	0.169	Mar 2020	0.200	Mar 2021	-		0.200	Continuing	Continuing	-
<b>Subtotal</b>			-	0.080		0.600		0.800		-		0.800	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 654236 / <i>Engineering Analysis</i>
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	2.822	2.421	4.458	-	4.458	Continuing	Continuing	N/A

**Remarks**

FFRDC Cybersecurity Vulnerability Analysis: FY18 carryover permitted funding of FY19 activities. FY20 reflects current allocated FY20 Staff Years of Technical Effort (STE) allocations that have been decreased across AFNWC.

FFRDC Emulation of the Strategic Missile Integration Complex (SMIC): PY increases reflect actuals to initiate an accelerated program through FY19.

Secure Cyber Facility Support PY increase (\$0.273M) reflects actuals supporting the stand-up of engineering analysis capabilities within AFNWC/EZ. FY20 has decreased to reflect actual program operations into FY21, to include facility requirements supporting increase in personnel and mission.

Mission Support PY through FY20 requirements increased reflecting additional PY STE support.

Model Based Systems Engineering (MBSE) PY requirements were delayed into FY20, as manpower was established and will continue to grow into future years.

EZ A&AS requirements reflect PY actuals that were decreased due alternative funding options. The FY20 increase supports increased program requirements supporting establishment of program capabilities across AFNWC/EZ cybersecurity and engineering analysis.

Program Management Support (PMA) PY reflects actuals decreased by alternative funding sources. FY20-21 increases as program capabilities increase overall.



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 654236 / <i>Engineering Analysis</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Engineering &amp; Cyber Security Analysis</b>	
Cyber Security Vulnerability Assessments & Analysis	
Emulation of the SMIC	
Secure Cyber Facility Support	
MBSE	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 654236 / <i>Engineering Analysis</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Engineering &amp; Cyber Security Analysis</i></b>				
Cyber Security Vulnerability Assessments & Analysis	1	2019	4	2025
Emulation of the SMIC	1	2019	4	2025
Secure Cyber Facility Support	1	2019	4	2025
MBSE	2	2020	4	2025

**Note**

MBSE delayed from FY19Q1 into FY20Q2 due to inadequate manpower and facility support. Sufficient support expected in FY20.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604222F / Nuclear Weapons Support				<b>Project (Number/Name)</b> 654807 / Nuclear Weapon System Technology and Integration			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
654807: Nuclear Weapon System Technology and Integration	-	0.000	0.000	19.357	0.000	19.357	19.767	20.123	20.498	20.891	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 5, PE 0604222F, project 654807, Weapons Effects, is a new start.  
 This program, BA 5, PE 0604222F, project 654807, Air Force Nuclear Red Team (AFNRT), is a new start.  
 This program, BA 5, PE 0604222F, project 654807, Advanced Concepts Studies (ACS), is a new start.  
 This program, BA 5, PE 0604222F, project 654807, Nuclear Certification, is a new start.

**A. Mission Description and Budget Item Justification**

The Air Force Nuclear Weapons Center (AFNWC) is the executing agency for this program that ensures the safety, survivability, security, and reliability of Air Force nuclear weapon systems in direct support to the National Command Structure and military warfighter with emphasis placed on assurance of survivability and mitigation of vulnerabilities to these unique systems. These requirements are met through studies and analyses, demonstration, modeling and simulation (M&S), test and evaluation (T&E), trade studies, requirements analysis, and recommendations to planning, policy, and doctrine.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Weapons Effects	0.000	0.000	6.051	0.000	6.051
<b>Description:</b> Ensures survivable and effective AF systems through evaluation, test, and analyses of nuclear environments and their impact to AF platforms. Develops and maintains the sole AF analytical capability to assess nuclear effects, systems inherent hardness and mission degradation within a nuclear environment. These efforts shape requirements for new acquisitions, fielded systems, as well as providing critical expertise for exercises and operational planning.					
<b>FY 2020 Plans:</b> FY 2021 new start. Program moves from O&M (PE 0104222F) into RDT&E beginning in FY21.					
<b>FY 2021 Base Plans:</b> Development, modernization, verification and validation of modeling and simulation (M&S) tools. Develop rigorous methods and tools for testing and predictive response to nuclear effects. Perform analysis to establish hardness requirements within the weapon system specification for current and future delivery aircraft, support					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 654807 / <i>Nuclear Weapon System Technology and Integration</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>aircraft, weapon systems, Intercontinental Ballistic Missiles (ICBM), and associated Nuclear Command, Control, and Communication (NC3) assets. Develop methods and tools used to assure weapon effectiveness in operationally relevant environments.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 new start. Program moves from O&amp;M (PE 0104222F) into RDT&amp;E beginning in FY21.</p>					
<p><b>Title:</b> Air Force Nuclear Red Team (AFNRT)</p> <p><b>Description:</b> The Air Force Nuclear Red Team (AFNRT) independently evaluates vulnerabilities of current and future strategic systems across their lifecycle vs near term and emerging threats. These strategic systems capability assessments include nuclear weapon systems fragility analyses, Vulnerability Modes &amp; Effects Analysis, M&amp;S and effects testing. As part of the effort to assess the vulnerabilities, data is used from various tests and modeling and simulation tools to develop mitigation strategies for consideration by program offices. This analysis of various threats to AF nuclear weapons systems is used to inform warfighter concept of operations (CONOPS), modernization activities, and new acquisitions.</p> <p><b>FY 2020 Plans:</b> FY 2021 new start. Program moves from O&amp;M (PE 0104222F) into RDT&amp;E beginning in FY21.</p> <p><b>FY 2021 Base Plans:</b> Assessing strategic system capabilities/vulnerabilities relative to Air-Delivered (AD) nuclear weapon systems, ICBMs, and NC3. Threat evaluations and analyses to address current and future threats that include, but not limited to, kinetic, Electronic Warfare (EW), cyber, supply chain and maintenance/logistics vulnerabilities. Assessments are evaluated using existing weapon/platform pairing with current and emerging threat vectors, as well as proposed modernization requirements. AD, ICBM, and NC3 assessments are used in the development of requirements, CONOPS and TTPs for modernization activities, and new acquisitions. These assessments include nuclear weapon systems fragility analyses, Vulnerability Modes &amp; Effects Analysis, M&amp;S and conduct effects testing.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>	0.000	0.000	13.306	0.000	13.306

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 654807 / <i>Nuclear Weapon System Technology and Integration</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
FY 2021 new start. Program moves from O&M (PE 0104222F) into RDT&E beginning in FY21.					
<p><b>Title:</b> Advanced Concepts Studies (ACS)</p> <p><b>Description:</b> Provides independent, analytical assessments to address current capability gaps and emerging warfighting needs of the nuclear enterprise through execution of early systems acquisition studies, analyses, and facilitation of technical demonstrations. Efforts are centered on future threats and requirements with a focus on maintaining or increasing system survivability. Activities inform the efforts of the science and technology community and are coordinated with the NNSA/DOE to enhance synergy within Joint DoD-DOE Nuclear Weapons Lifecycle activities.</p> <p><b>FY 2020 Plans:</b> FY 2021 new start. Program moves from O&amp;M (PE 0104222F) into RDT&amp;E beginning in FY21.</p> <p><b>FY 2021 Base Plans:</b> This activity is being transferred from other AFNWC program elements, the extent of which was not known when this document was created.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	0.000	0.000	0.000	0.000	0.000
<p><b>Title:</b> Nuclear Certification</p> <p><b>Description:</b> Nuclear certification management provides AF independent technical evaluations for delivery systems, support equipment, and facilities to ensure compliance with DoD and AF nuclear safety/compatibility policies in support of fielded system sustainment, modifications, and upgrades, seven new ACAT I/II acquisition programs, five new weapon generations facilities, and upgrades to the Master Nuclear Certification List infrastructure.</p> <p><b>FY 2020 Plans:</b> FY 2021 new start. Program moves from O&amp;M (PE 0104222F) into RDT&amp;E beginning in FY21.</p> <p><b>FY 2021 Base Plans:</b></p>	0.000	0.000	0.000	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 654807 / <i>Nuclear Weapon System Technology and Integration</i>

**B. Accomplishments/Planned Programs (\$ in Millions)**

This activity is being transferred from other AFNWC program elements, the extent of which was not known when this document was created.

***FY 2021 OCO Plans:***

N/A

***FY 2020 to FY 2021 Increase/Decrease Statement:***

N/A

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	19.357	0.000	19.357

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Multiple Cost Plus Fixed Fee (CPFF) and/or Time and Material (T&M) and Military Interdepartmental Purchase Requests (MIPR) are/will be used to obtain technical analyses and/or technical support for the technology and integration processes. All contracts will be openly competed.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / Nuclear Weapons Support	<b>Project (Number/Name)</b> 654807 / Nuclear Weapon System Technology and Integration
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Assessments	MIPR	SNL, LLNL, LANL (LABS) : Kirtland AFB, NM	-	0.000		0.000		5.630	Jan 2021	0.000		5.630	Continuing	Continuing	-
Modeling & Simulation	C/CPFF	Peerless : Kirtland AFB, NM, NM	-	0.000		0.000		3.095	Apr 2021	0.000		3.095	Continuing	Continuing	-
RV Analysis	MIPR	MSIC : Kirtland AFB, NM	-	0.000		0.000		1.800	Jun 2021	0.000		1.800	Continuing	Continuing	-
Engineering Support	MIPR	Aerospace (SMC) : Kirtland AFB, NM	-	0.000		0.000		2.075	Oct 2020	0.000		2.075	Continuing	Continuing	-
Security Support	MIPR	ManTech : Kirtland AFB, NM	-	0.000		0.000		0.633	Jan 2021	0.000		0.633	Continuing	Continuing	-
Program Support	C/CPFF	DTIC (DS-TAT) : Kirtland AFB, NM	-	0.000		0.000		3.700	Jun 2021	0.000		3.700	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		0.000		16.933		0.000		16.933	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Weapons Effects Uncertainty Testing	MIPR	Not specified. : Kirtland AFB, NM	-	0.000		0.000		1.600	May 2021	-		1.600	Continuing	Continuing	-
Thermal Test	Allot	AFRL : Kirtland AFB, NM	-	0.000		0.000		0.300	Jan 2021	-		0.300	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		0.000		1.900		-		1.900	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMA	Various	Various : Kirtland AFB, NM	-	0.000		0.000		0.524	Sep 2021	0.000		0.524	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 654807 / <i>Nuclear Weapon System Technology and Integration</i>
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
<b>Subtotal</b>			-	0.000		0.000		0.524		0.000		0.524	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	0.000		0.000		19.357		0.000		19.357	Continuing	Continuing	N/A

**Remarks**  
The funding increase is due to activities moved into PE 0604222F (BPAC 654807) to more properly align with RDT&E activities.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 654807 / <i>Nuclear Weapon System Technology and Integration</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>AF Nuclear Red Team</b>																												
SSCA Vulnerability Assessments																												
<b>Weapons Effects</b>																												
Thermal Testing																												
Weapons Uncertainty																												
Modeling & Simulation																												
<b>Program Support</b>																												
Engineering																												
Security																												
Program																												
PMA																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 654807 / <i>Nuclear Weapon System Technology and Integration</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>AF Nuclear Red Team</i></b>				
SSCA Vulnerability Assessments	2	2021	1	2025
<b><i>Weapons Effects</i></b>				
Thermal Testing	2	2021	1	2025
Weapons Uncertainty	3	2021	2	2022
Modeling & Simulation	3	2021	2	2025
<b><i>Program Support</i></b>				
Engineering	1	2021	4	2025
Security	2	2021	4	2025
Program	3	2021	2	2025
PMA	4	2021	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604222F / Nuclear Weapons Support				<b>Project (Number/Name)</b> 655708 / Nuclear Weapons Support			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
655708: Nuclear Weapons Support	-	1.489	1.985	11.218	0.000	11.218	6.939	1.982	2.018	2.055	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

New Weapon Generation Facilities (WGF) within AFGSC are adopting a new concept of operations by integrating maintenance and storage mission sets into one facility. To support mission generation requirements, facility support equipment and capabilities must be reviewed, modified or in extreme cases, re-developed in order to maintain operational readiness. Examples of equipment under review include, but not limited, munition trailers/accessories, munition lifts/accessories, tow vehicles and munition test/maintenance stands such as the MHU-141, MHU-174, MHU-83, MHU-196/204 & MB-4. This review and potential modification of existing equipment ensures mission generation remains executable.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Weapon Generation Facility Material Handling Systems	1.489	1.985	11.218	0.000	11.218
<b>Description:</b> Weapon Generation Facility Material Handling System Review					
<b>FY 2020 Plans:</b> This effort will continue the review of material handling system equipment to accommodate the new WGF concept of operations by integrating maintenance and storage mission sets into one facility. Analysis will determine the ability of existing equipment capability to support mission generation requirements and facility support equipment. Analysis will determine whether modification or re-development of equipment is required.					
<b>FY 2021 Base Plans:</b> This effort will continue the review of material handling system equipment to accommodate the new WGF concept of operations by integrating maintenance and storage mission sets into one facility. Examples of equipment under review include, but not limited, munition trailers/accessories, munition lifts/accessories, tow vehicles and munition test/maintenance stands such as the MHU-141, MHU-174, MHU-83, MHU-196/204 & MB-4. Current efforts will include the development, design, and test of suitable WGF munition tow equipment. Budget include funds for PMA, A&AS, travel and other equipment required to execute program activities as well as develop nuclear-related requirements across the enterprise that impact operations of the WGF.					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 655708 / <i>Nuclear Weapons Support</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
FY21 funding increase due to greater efforts in analyzing existing equipment capability to support mission requirements. Results will determine whether modification or re-development of equipment is required.					
<b>Accomplishments/Planned Programs Subtotals</b>	1.489	1.985	11.218	0.000	11.218

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The acquisition strategy for a WGF-capable munitions tow equipment is expected to be modified commercial off-the-shelf (COTS) based on market research but may change pending any industry responses to government solicitation. The acquisition strategy for any additional equipment is on-going and will focus on determining if existing support equipment can be modified or if a re-development effort is required. Once the analysis determines which course of action is required the appropriate acquisition strategy will be defined.





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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604222F / <i>Nuclear Weapons Support</i>	<b>Project (Number/Name)</b> 655708 / <i>Nuclear Weapons Support</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>WGF - Facility Support Equipment</i></b>				
Market Research/Contract Development (Tug)	3	2019	2	2020
Facility Support Equipment Modification/Development	1	2020	4	2025
Requirements Definition (Munition Loader)	1	2020	2	2020
Market Research (Munition Loader)	3	2020	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604270F / <i>Electronic Warfare Development</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	1.839	2.066	2.098	0.000	2.098	2.142	2.181	43.495	17.734	Continuing	Continuing
653891: <i>Adv Infrared Counter Measures(Aircm)</i>	-	1.839	2.066	2.098	0.000	2.098	2.142	2.181	43.495	17.734	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

The Advanced Infrared Countermeasure (AIRCМ) project contains related aircraft self-protection efforts aimed at increasing aircraft survivability against the increasing threat of sophisticated surface-to-air and air-to-air missiles. These missiles may employ sophisticated next-generation Electro-Optics (EO), Infrared (IR), Radio Frequency (RF), dual-mode (i.e. IR and RF), or multi-mode seekers. AIRCM will provide advanced expendable countermeasures and/or techniques that will be functionally compatible with existing dispenser systems and employed across multiple USAF weapons systems. This also explicitly includes any and all flare, chaff, decoy, and associated components development and testing that may be demanded or needed in current operations supporting the war on terrorism regardless of aircraft platform. Similar activities that are supplementary to this effort may be accomplished ad hoc using platform specific funding or through other activities such as joint services or NATO test groups.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Advanced Infrared Countermeasure weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	1.909	2.066	2.102	0.000	2.102
Current President's Budget	1.839	2.066	2.098	0.000	2.098
Total Adjustments	-0.070	0.000	-0.004	0.000	-0.004
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.070	0.000			
• Other Adjustments	0.000	0.000	-0.004	0.000	-0.004

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

**Appropriation/Budget Activity**  
3600: *Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)*

**R-1 Program Element (Number/Name)**  
PE 0604270F / *Electronic Warfare Development*

**Change Summary Explanation**

No Significant Changes

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604270F / <i>Electronic Warfare Development</i>				<b>Project (Number/Name)</b> 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
653891: <i>Adv Infrared Counter Measures(Aircm)</i>	-	1.839	2.066	2.098	0.000	2.098	2.142	2.181	43.495	17.734	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Advanced Infrared Countermeasure (AIRCМ) project contains related aircraft self-protection efforts aimed at increasing aircraft survivability against the increasing threat of sophisticated surface-to-air and air-to-air missiles. These missiles may employ sophisticated next-generation Electro-Optics (EO), Infrared (IR), Radio Frequency (RF), dual-mode (i.e. IR and RF), or multi-mode seekers. AIRCM will provide advanced expendable countermeasures and/or techniques that will be functionally compatible with existing dispenser systems and employed across multiple USAF weapons systems. This also explicitly includes any and all flare, chaff, decoy, and associated components development and testing that may be demanded or needed in current operations supporting the war on terrorism regardless of aircraft platform. Similar activities that are supplementary to this effort may be accomplished ad hoc using platform specific funding or through other activities such as joint services or NATO test groups.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Advanced Infrared Countermeasure weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Countermeasure Testing	1.839	2.066	2.098	-	2.098
<b>Description:</b> Testing and qualification of EO, IR, and RF countermeasures on aircraft					
<b>FY 2020 Plans:</b> Activities include threat analysis, development, modeling & simulation, testing and qualification of expendable countermeasure cocktails on various aircraft.					
<b>FY 2021 Base Plans:</b> Activities include development, testing and qualification of expendable countermeasures or cocktails on various aircraft.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased due to inflation.					
<b>Accomplishments/Planned Programs Subtotals</b>	1.839	2.066	2.098	-	2.098

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604270F / <i>Electronic Warfare Development</i>	<b>Project (Number/Name)</b> 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>			<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• PAAF 01 352010: <i>Cartridges</i>	188.227	193.091	123.365	40.434	163.799	161.666	145.812	109.608	122.330	Continuing	Continuing
• PAAF 01 356010: <i>Flares</i>	109.402	129.388	40.088	21.171	61.259	91.329	94.254	67.301	66.715	Continuing	Continuing

**Remarks**

Qualified flares, if not in AF inventory, will be procured under program 0208030F War Reserve Munitions, Flares.

**D. Acquisition Strategy**

Contracts are awarded through the Department of Defense Ordnance Technology Consortium (DOTC), or other OTAs, such as Cornerstone Industrial Base Analysis & Sustainment (IBAS), which facilitates collaborative Government, Industry, and Academic ordnance technology development and prototyping initiatives. They serve as a single point contracting agent for development/technology demonstrations needed to advance and expand our military technological superiority.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604270F / <i>Electronic Warfare Development</i>	<b>Project (Number/Name)</b> 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Pulse Kinematic Development	C/CPFF	DOTC : ARDEC, PA	-	-		0.857	Jun 2020	-		-		-	Continuing	Continuing	-
IR/UV	C/CPAF	DOTC : ARDEC, PA	-	-		0.209	Jun 2020	1.098	Jun 2021	-		1.098	Continuing	Continuing	-
<b>Subtotal</b>			-	-		1.066		1.098		-		1.098	Continuing	Continuing	N/A

**Remarks**  
Development of Advanced Expendable Countermeasures to defeat currently fielded threats from which aircraft are not sufficiently protected.

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Aircraft/Unit Support	MIPR	AATC : Tucson, AZ	-	0.260	Jun 2019	-		-		-		-	Continuing	Continuing	-
Mission Planning	MIPR	MTSI : Las Vegas, NV	-	0.260	Jun 2019	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.520		-		-		-		-	Continuing	Continuing	N/A

**Remarks**  
AATC (Air National Guard Air Force Reserve Test Center) supports ACC/CAF in coordinating and managing aircraft use to conduct advanced expendable countermeasure testing (this does not support other AMC or AFSOC)  
  
Mission planning: Provides for programming of mission data required for each airframe and each expendable countermeasure or flare cocktail; this does not support AMC or AFSOC

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604270F / <i>Electronic Warfare Development</i>	<b>Project (Number/Name)</b> 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Modeling and Simulation	MIPR	Air Force Research Laboratory : WPAFB, OH	-	0.245	Jun 2019	1.000	Jun 2020	1.000	Jun 2021	-		1.000	Continuing	Continuing	-
Range Test	MIPR	96th Test Wing : Eglin AFB, FL	-	1.016	Jun 2019	-		-		-		-	Continuing	Continuing	-
Test Support	MIPR	Various : NV	-	0.038	Jun 2019	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	1.299		1.000		1.000		-		1.000	Continuing	Continuing	N/A

**Remarks**

Modeling and simulation

- This entails performance of modeling and simulation (to include threat hardware in-the-loop) which helps to predict advanced expendable countermeasure effectiveness and develop and define Air Force requirements
- Performing activity varies; conducted by AFRL and Georgia Tech Research Center

Range Test

- This is the cost to use the range for testing (Radiometric, Captive Seeker, Flight, etc.)
- Performing Activity & Location varies; 96th Test Wing, Eglin AFB, FL, White Sands Missile Range, NM, Gila Bend, AZ

Test Support

- This includes but is not limited to Seeker Test Vans (multiple vans required for Captive Seeker), duo chrome camera, and other test equipment
- Activities/support during testing (i.e. communications/electric/security)
- Performing Activity & Location should remain "Various: TBD", multiple activities are included

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Program Office/ Government Support	Various	Air National Guard Air Force Reserve Command Test Center : Tucson, AZ	-	0.020	May 2019	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.020		-		-		-		-	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604270F / <i>Electronic Warfare Development</i>	<b>Project (Number/Name)</b> 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

**Remarks**  
AATC provides all the management, preparation and coordination of advanced expendable countermeasure testing efforts for ACC/CAF (this does not include support for AMC or AFSOC)

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	1.839	2.066	2.098	-	2.098	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604270F / <i>Electronic Warfare Development</i>	<b>Project (Number/Name)</b> 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Advance IR Aircm</b>	
Modeling and Simulation - Threat Exploitation	
Pulse Kinematic Flare Development	
Advanced IR Flare Development - Threat 1	
Advanced IR Flare Development - Threat 2	



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604270F / <i>Electronic Warfare Development</i>	<b>Project (Number/Name)</b> 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Advance IR Aircm</i></b>				
Modeling and Simulation - Threat Exploitation	1	2019	4	2025
Pulse Kinematic Flare Development	1	2019	3	2023
Advanced IR Flare Development - Threat 1	1	2021	4	2024
Advanced IR Flare Development - Threat 2	1	2025	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	242.328	189.631	131.909	0.000	131.909	171.716	166.618	61.734	71.811	Continuing	Continuing
655050: <i>TDL System Integration</i>	-	223.518	189.631	109.868	0.000	109.868	121.108	127.675	57.727	58.790	Continuing	Continuing
655262: <i>Family of Gateways</i>	-	18.810	0.000	22.041	0.000	22.041	50.608	38.943	4.007	13.021	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

The Tactical Data Networks Enterprise (TDNE) develops, enhances and fields Tactical Data Links (TDL), advanced waveforms, radios, network management tools, and associated hardware and software that comprise the Joint Aerial Layer Network (JALN). This will be accomplished by upgrading currently fielded communications and TDL systems and by developing and fielding more advanced future systems in support of the Advance Battle Management System (ABMS). TDNE also addresses warfighter urgent demands through the establishment of Quick Reaction Capabilities (QRC) and Enterprise activities. TDNE supports the development, fielding and training of aerial layer networking capabilities across multiple core functions including air superiority, ground precision attack, command and control, intelligence, surveillance and reconnaissance (ISR), and personal recovery while integrating capabilities with space operations. TDNE executes quick reaction response capability requests by the warfighter and support activities (including ramp-up) associated with the Joint Aerial Layer Network (JALN) Enterprise activities. This program ensures the continued enhanced interoperability of Air Force and joint/coalition/NATO assets through efforts such as early systems engineering and use of the Political, Operational, Economic and Technical (POET) process for program requirements analysis and architectural design development/coordination of all TDN standards and management capabilities, configuration management, platform/system interoperability assessments, development of government reference architectures, interoperability certification testing, and flight testing. Protected Tactical Waveform (PTW) is a waveform designed to mitigate the effects of advanced jamming in Anti-Access/Area Denial environments. PTW provides worldwide, beyond line of sight, Anti-Jam (AJ), Low Probability of Intercept communications, via military and commercial satellite systems for tactical users in all services. It includes terminal certification efforts (Information Assurance (IA), NSA and MIL-STD). PTW development activities may include technical and acquisition-related studies, analysis, early systems engineering and risk reduction activities, addressing all subsystems to support both current program planning/execution and future AF program planning. This effort also funds PTW modem development and aperture development on suitable platforms.

TDL System Integration will provide for the study (acquisitions current and proposed), analysis, enhancement, development, integration, demonstration, test, and evaluation of Tactical Data Links (TDLs) as a subset of the broader aerial layer networks. TDLs are used in both peace time and combat environments to exchange information such as character-oriented and fixed-formatted messages, data, radar tracks, target information, platform status, imagery, free-text messaging and command assignments. TDLs provide interoperability, local and global connectivity, and situational awareness to the user when training or fighting under rapidly changing operational conditions. TDLs increase mission effectiveness by providing enhanced air domain situational awareness, positive combat identification of aircraft in the network, fusion/correlation of on- and off-board sensor data, digital sharing of machine-to-machine target and threat information, thereby, enabling time critical targeting and other mission assignment tasking. TDLs are used by all service theater command and control (C2) elements, weapons platforms, and sensors. TDLs include, but are not limited to: Link 16, Link 11, Link 22, Situational Awareness Data Link (SADL), Variable Message Format (VMF), Intra-Flight Data Link (IFDL), and other Advanced TDL Link technologies, such as Tactical Targeting Network Technology (TTNT), Common Data Link (CDL), Multifunction Advanced Data Link (MADL), and Airborne Extensible Relay and Over the Horizon Network (AERONet). TDLs typically include both a waveform specification as well as the standards for exchanging messages. Agile Communications include the capability to share tactically significant information within/to/from highly contested environments in support of the Air

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>
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Superiority 2030 Flight Plan. Agile Communication efforts provide for pre-Analysis of Alternatives (AoA) and development activities. High Capacity Backbone (HCB), a subset of the overall JALN concept, will provide the warfighter with a robust communication infrastructure enhancing C2 capabilities. HCB connects users operating within disadvantaged conditions to space and terrestrial communications utilizing Deployed Ground Entry Points (DGEP) and aerial nodes. Tactical Data Link Planning, Analysis and Planning (TDL PAM) provides a tool to monitor, troubleshoot and repair any issues with Link 16 network. Link 16 Enhancements will develop and field a advanced signal processing capability on Airborne platforms to address threats in the contested and highly contested environments. To address future Advanced Tactical Datalinks, development of a Software Programmable OMS compliant (SPOC) radio terminal prototype is being built and tested. SPOC will provide a next generation radio set capable of hosting a variety of advanced tactical datalinks.

Family of Gateway provides for the study (acquisitions current and proposed), analysis, enhancements, development, integration, costing, demonstration, test, and evaluation efforts that will allow joint combat forces to exchange information quickly and accurately by bridging discrete airborne, terrestrial, maritime, and space-based C4ISR networks producing operational effects not possible within individual networks. Gateway functions include enabling interoperability between data formats, protocols, and communication mediums. Additionally, gateway functions extend the connectivity range, consolidate data from multiple networks into high capacity links for transmission to key C2ISR nodes, route information between disadvantaged users, and fuse/correlate data from multiple sources to improve accuracy. Gateway functions also provide application hosting, shared data storage, on-demand information access, smart data forwarding, and system monitoring and network management. Further, this project supports 5th-to-4th Generation efforts and future TDL communications development. Additionally, Family of Gateways will support to enhance existing TDL performance, through upgrades and engineering analysis of system designs. Efforts in this project include waveform, ground, and rapid acquisition activities supporting Air Force requirements for communication bridging across multiple platforms, sources and communication domains. This program element may include necessary civilian pay expenses required to manage, execute, and deliver Tactical Data Network Enterprise weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

The FY 20 funding request was reduced by \$40 million to account for the availability of prior year execution balances.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Tactical Data Network system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	270.015	229.631	202.397	0.000	202.397
Current President's Budget	242.328	189.631	131.909	0.000	131.909
Total Adjustments	-27.687	-40.000	-70.488	0.000	-70.488
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	-40.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-21.200	0.000			
• SBIR/STTR Transfer	-6.487	0.000			
• Other Adjustments	0.000	0.000	-70.488	0.000	-70.488

**Change Summary Explanation**

FY 2019:

- Project 655050, funding was increased by \$50.0 million congressional add to accelerate ABMS
- Project 655050, funding was increased by \$14.888 million as a technical adjustment for PTW
- Project 655050, funding was decreased by \$21.2 million for higher Air Force needs
- Project 655050, funding was decreased by \$6.487 million for Small Business Innovation Research

FY 2020:

- Project 655050, funding was decreased by \$40.0M to account for availability of prior year execution balance

FY 2021:

- Project 655050, funding was decreased by \$46.0M to account for availability of prior years execution balance
- Project 655262, \$24.5M was reprogrammed to PE 27417F (AWACS) for 5th to 4th Generation Gateway on E-3 risk reduction, development and integration

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>				<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
655050: <i>TDL System Integration</i>	-	223.518	189.631	109.868	0.000	109.868	121.108	127.675	57.727	58.790	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Tactical Data Links (TDL) System Integration provides for the study, analysis, enhancement, development, integration, demonstration, joint/coalition/NATO interoperability exercises, costing, test, trials, and evaluation of TDL as a subset of the broader aerial layer network. TDLs are used in both peacetime and combat environments to exchange information such as character-oriented and fixed-formatted messages, data, radar tracks, target information, platform status, imagery, free-text messaging and command assignments. TDLs provide interoperability, local and global connectivity, and situational awareness to the user when training or fighting under rapidly changing operational conditions. TDLs increase mission effectiveness by providing enhanced air domain situational awareness, positive combat identification of aircraft in the network, fusion/correlation of on- and off-board sensor data, digital sharing of machine to machine target and threat information and, thereby, enabling time critical targeting and other mission assignment tasking. TDLs are used by all service, NATO, and coalition theater C2 elements, weapons platforms, and sensors.

The number of Air Force platforms hosting TDLs has expanded from C2 aircraft (E-3, E-8, E-11A, EQ-4B, etc.) to the fighter, bomber, intelligence, surveillance and reconnaissance (ISR), tanker, airlift and other tactical fleets (F-15, F-16, F-22A, Rivet Joint, B-1, B-2, B-52, KC-46, etc.), as well as precision guided munitions. Utilization of TDLs in joint and international environments requires the integration of terminals into host platforms and interoperability of TDL networks across all deployed joint/Coalition/NATO platforms. Recent mandates require additional studies and analysis in order to meet frequency reprogramming and cryptographic requirements.

Efforts in this project include waveform and integration activities.

**Waveform:**  
Waveform activities include, but are not limited to, enabling and supporting Joint Interoperability of Tactical Command and Control Systems (JINTACCS), joint/Coalition/NATO Interoperability, Link 16 enhancements, and development of a next generation waveform and/or advanced tactical data link. Funding will provide training, logistics development, testing and certification of individual TDL implementations to joint/allied standards, establishment of service-wide network management procedures/operations, and system wide enhancements/testing, demonstration and experimentation.

**Integration:**  
Integration activities include but are not limited to, Data Link Test Facility (DTF), MIDS JTRS, Air Force Participating Test Unit (AFPTU), Interoperable System Management and Requirements Transformation (iSMART), Network Centric Capability Assessment (NCCA), NATO interoperability, Coalition interoperability, TDL Planning, Analysis, and Monitoring (TDL PAM), integration analysis of C2 of JALN, Combat Cloud, Protected Tactical Waveform (PTW) and analysis of integration on platforms of existing TDN systems, system-of-systems analysis. Funding will ensure continued enhanced interoperability of Air Force/joint/Coalition/NATO assets through efforts such as early systems engineering and use of the POET process for program requirements analysis and architectural design development/coordination

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>
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of all TDN standards and management capabilities, configuration management, platform/system interoperability assessments, development of government reference architectures, integration of cyber technologies, interoperability certification testing, and flight testing, demonstration and experimentation.

Activities also include studies, prototypes and analysis (engineering and cost) to support both current program planning and execution and future program planning efforts for Tactical Data Networks (TDN), including development of joint concepts for C2 of JALN, JALN Analysis of Alternatives (AoA) follow-on analysis, JALN gateway planning, and Advanced Battle Management systems (ABMS).

Activities will also include joint/Coalition/NATO Interoperability that provides program office system engineering to support Foreign Military Sales (FMS). Agile Communications include the capability to share tactically significant information within/to/from highly contested environments in support of the Air Superiority 2030 Flight Plan. Agile Communication efforts provide for pre-Analysis of Alternatives (AoA) and development activities. Agile Communications supports the application of open standards & advanced apertures over an Enterprise-wide Aerial Network, enabling all platforms to share combat-relevant data/info to, from & within the Highly Contested Environment (HCE).

High Capacity Backbone (HCB) effort implements an incremental approach for deploying resilient reach back connectivity to DISN services and in-theater rear echelon organizations through dedicated aerial gateways and opportunistic airborne nodes. The HCB Transport supports a robust deployable ground infrastructure required, through reach back, range extension and payload control. It will use an open system approach composed of non-proprietary government and commercial interface standards. Link 16 Enhancement will develop and field advanced signal processing capabilities on 4th and 5th generation platforms to address threats in the contested and highly contested environments.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><b>Title:</b> Tactical Data Networks (TDN) Integration</p> <p><b>Description:</b> TDN Integration activities include but are not limited to, Data Link Test Facility (DTF), Air Force Participating Test Unit (AFPTU), Network Centric Capability Assessment (NCCA), Joint/Coalition/NATO Interoperability, Joint Aerial Layer Network (JALN) Analysis of Alternatives (AoA) follow-on, JALN gateway planning, as well as Joint Interoperability of Tactical Command and Control Systems (JINTACCS) ensures interoperability of TDL systems with associated joint, allied, and Coalition systems. It includes configuration management of TDL Military Standards (MIL-STDs), TDL message development, interoperability test/certification, and TDL message standard implementation using interoperable System Management and Requirements Transformation (iSMART) for Link 11A/B, Link 16, Link 22, Variable Message Format (VMF), Integrated Broadcast Service (IBS), Intra-flight Data Link (IFDL), Multifunction Advanced Data Link (MADL), and others.</p> <p><b>FY 2020 Plans:</b></p>	94.758	30.243	23.847	-	23.847

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>-Managing the development, certification, developmental training, and logistics plans for individual TDL implementations to joint/allied standards</p> <p>-Providing management with the necessary engineering, technical, and administrative support needed to facilitate development of systems, add and/or update Air force platform and system information exchange requirements</p> <p>-Planning for testing, integration, and associated training for MIDS JTRS upgrade configurations</p> <p>-Providing support to TDL interoperability testing of development and fielded systems through the DTF</p> <p>-Supporting and funded DoD-mandated TDL MIL-STD conformance testing and interoperability assessments for all TDL-capable Air Force platforms through the AFPTU and JINTACCS.</p> <p>-Conducting aerial layer network focused studies and analysis that support data link enhancements</p> <p>-Assessing tactical airborne network and network management gaps that are validated in existing requirements documents through the Network Centric Capability Assessments (NCCA)</p> <p>-Studies and analysis will include, but will not be limited to, supporting both current program planning and execution and future program planning efforts for TDN (e.g. development of joint concepts for C2 and network management of the Joint Aerial Layer Network, Combat Cloud, and JALN gateway planning)</p> <p>-Providing support to Coalition interoperability and provided program office system engineering to support NATO C3I, Foreign Military Sales (FMS) case development, FMS planning for technology refresh modifications, Crypto-Modernization, and Net Management</p> <p>-Providing support to the DTF and AFPTU with required hardware and software upgrades and license renewals, which provided development and interoperability support for new capabilities and technology growth</p> <p>-Providing support to Agile Communications efforts that include pre-Analysis of Alternatives (AoA) and development activities</p> <p>-Ensuring compatibility and interoperability of TDLS by developing TDL messaging capability to address new or updated operational requirements</p> <p><b>FY 2021 Base Plans:</b></p> <p>-Will continue to manage the development, certification, training and logistics plans for individual TDL implementations to Joint/allied standards.</p> <p>-Will continue to provide the necessary engineering, technical, and administrative support required to add and/or update Air Force platform and system information exchange requirements</p> <p>-Will continue to ensure compatibility and interoperability of TDLS by funding required Air Force/joint MIL-STD compliance and interoperability tests</p>					



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>			
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>					
	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
-Will continue to ensure compatibility and interoperability of TDLs by developing TDL messaging capability to address new or updated operational requirements					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease due to rescoping of program. Changes to TDN Integration due to realigned budget to match Workload Master List (WML)					
<b>Title:</b> High Capacity Backbone (HCB)					
<b>Description:</b> High Capacity Backbone (HCB) is an expeditionary dynamic network made up of aerial and ground nodes that augment existing communication networks to greatly increase connectivity, network capacity, and information sharing at all security levels in order to effectively employ military capability across the range of military operations. HCB reduces joint forces reliance on limited, relatively fixed/static satellite and surface line-of-sight communication components. HCB rapid prototyping is a demonstration of HCB network transport installed in existing USAF aircraft and deployable ground entry points that meets this Rapid Prototyping Requirements Document's threshold technical and functional requirements while operating as an integral part of an aerial layer network in a realistic operational environment such as exercise Northern Edge 2021. HCB capabilities are required to close four specific capability gaps: network connectivity, network capacity, share information and data, and network management.					
	2.235	51.000	32.982	-	32.982
<b>FY 2020 Plans:</b> -Utilizing the HCB Rapid Prototyping Requirements document (RPRD) will issue/award a contract for the development of an airborne and ground prototype -Utilizing either MIT LL or the Data Link Enterprise ID/IQ to develop the airborne and ground nodes to address phase 1 requirements in the HCB RPRD -Investigating the develop of phased array or equivalent antenna to support the HCB demonstration -Developing a test plan for use at Northern Edge 21					
<b>FY 2021 Base Plans:</b> -Will continue the development of the airborne and ground prototypes -Will conduct test of the prototypes at Northern Edge 21 -Will develop a follow-on contract for fielding of the HCB that will be fielded on various airborne platforms					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Reduction due to focus of development scope					
<p><b>Title:</b> Protected Tactical Waveform (PTW)</p> <p><b>Description:</b> Protected Tactical Waveform (PTW) is a waveform designed to mitigate the effects of advanced jamming in Anti-Access/Area Denial environments. PTW provides worldwide, beyond line of sight, Anti-Jam (AJ), Low Probability of Intercept communications, via military and commercial satellite systems for tactical users in all Services. This effort funds PTW modem development and aperture development on suitable platforms like (but not limited to) RQ-4 Global Hawk and EQ-4B/E-11A Battlefield Airborne Communications Node (BACN). PTW provides communications path diversity by increasing SATCOM resilience through satellite, spectral, and waveform diversity. This effort continues work started in Protected Tactical Service Field Demonstration (PTSFD) to complete PTW maturity and modem development, leveraging TALON Tacet Avis aperture work to develop PTW antenna and radome. It includes terminal certification efforts (Information Assurance (IA), NSA and MIL-STD). This effort funds continued development of PTW components, protected tactical terminal modems that will be capable of being fully integrated into existing wideband terminals and will ensure delivery of protected tactical SATCOM to the joint and coalition warfighters in contested, degraded environments. PTW development activities may also include technical and acquisition related studies, analysis, and early systems engineering and risk reduction activities addressing all subsystems to support both current program planning/execution and future AF program planning.</p> <p><b>FY 2020 Plans:</b> -Developing and testing of the PTWSAT radio terminal prototype</p> <p><b>FY 2021 Base Plans:</b> No FY 21 funding</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No funding projected in FY 21</p>	23.183	16.588	0.000	-	0.000
<p><b>Title:</b> TDL Planning, Analysis, and Monitoring (TDL PAM)</p> <p><b>Description:</b> The Air Force has a requirement for a TDL network planning, analysis and monitoring capability. TDL PAM's operational requirements are to support the Joint Interface Control Officer (JICO) in the Air and Space Operations Center (AOC); Regional Interface Control Officer (RICO) in the Control Reporting Center (CRC); and Interface Control Officers in the Defense Sectors during the execution and management of the Joint Multi-Tactical Data Link Network (MTN) architecture. Network complexity, large AORs, challenging terrain, and</p>	8.824	1.000	4.998	-	4.998

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>			
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
capacity issues within the MTN require a management tool that helps operators plan for the effective use of MTN capabilities.  <b>FY 2020 Plans:</b> -Procuring LMMT for test and evaluation in the AOC, CRC, and the Defense Sectors weapon systems and continue funding LMMT incorporating AF requirements  <b>FY 2021 Base Plans:</b> - Will test and evaluate LMMT system in the AOC, CRC, and the Defense Sectors weapon systems and will continue funding incorporation of AF requirements into LMMT  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase due to ramp up in development and AF requirements integration into LMMT system					
<b>Title:</b> Agile Comms  <b>Description:</b> Agile Comms supports the application of open standards and advanced apertures over an Enterprise-wide Aerial Network, enabling all platforms to share combat-relevant data/info to, from and within the Highly Contested Environment (HCE).  <b>FY 2020 Plans:</b> -Continuing post ICD and pre AoA activities including the development of the Architecture and Enterprise Approach to the Joint Aerial Network  <b>FY 2021 Base Plans:</b> - Will continue post ICD and pre AoA activities including the development of the Architecture and Enterprise Approach to the Joint Aerial Network  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Ramp down in research and development ahead of procurement	72.942	64.212	25.257	-	25.257
<b>Title:</b> Link 16 Enhancements  <b>Description:</b> Link 16 Enhancement will develop and field Link 16 Anti Jam (AJ) capabilities on 4th and 5th generation platforms to address Link 16 jamming threats in the contested and highly contested environments. This effort will implement Link 16 technologies into TDL terminals and investigate the integration of additional emerging technologies to improve communications reliability. This effort will maintain a government-controlled technical baseline(s) to efficiently execute development and enhancements. Emerging technologies will be	0.000	25.685	13.925	-	13.925

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>developed and evaluated for efficacy; recommendations will be identified for appropriate terminal fielding/upgrades to platforms and will be considered when evaluating enterprise TDL capabilities/gaps.</p> <p><b>FY 2020 Plans:</b> -Conducting development and operational test on integrated solution</p> <p><b>FY 2021 Base Plans:</b> -Will conduct development and operational test on integrated solution</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decreased due to rescoping of effort</p>					
<p><b>Title:</b> SFF/DACAS Modernization and System-of-Systems (SoS) Enterprise Integration</p> <p><b>Description:</b> This effort will support the development and demonstration of Small Form Factor (SFF) technologies that can support Digitally Assisted Close Air Support (DACAS) and other missions across the full spectrum of operating environments. This effort will consider System-of-Systems (SoS) engineering, technical analysis/performance, platform integration, and Tactics, Techniques, and Procedures (TTPs) to best utilize technologies and acquisition approaches for enterprise modernization.</p> <p><b>FY 2020 Plans:</b> -Developing and evaluating prototype towards future testing</p> <p><b>FY 2021 Base Plans:</b> -Will continue developing and evaluating prototypes -Will conduct testing of solutions</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increased due to ramp up in prototype evaluation</p>	3.945	0.903	8.859	-	8.859
<p><b>Title:</b> Applique Technologies for TDLs</p> <p><b>Description:</b> This effort will develop and test low Size, Weight, and Power (SWaP) applique production kits to support TDL communications; it will incorporate proven techniques related to RF components, system interfaces, and platform integration. This effort will identify appropriate platforms, apertures, and interfaces and evaluate using representative flight environments and conditions.</p> <p><b>FY 2020 Plans:</b></p>	0.631	0.000	0.000	-	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
-No FY20 funding <b>FY 2021 Base Plans:</b> -No FY21 funding <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A					
<b>Title:</b> Link 16 Evolution <b>Description:</b> This effort implements Link 16 technologies into TDL terminals and investigate the integration of additional emerging technologies to improve communications reliability. This effort will maintain a government-controlled technical baseline(s) to efficiently execute development and enhancements. Emerging technologies will be developed and evaluated for efficacy; recommendations will be identified for appropriate terminal fielding/upgrades to platforms and will be considered when evaluating enterprise TDL capabilities/gaps. <b>FY 2020 Plans:</b> -Working with MIDS PO to incorporate advanced signal processing algorithm in MIDS JTRS. Also, continue developing antennas for testing on F-15. <b>FY 2021 Base Plans:</b> -No FY21 funding <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A	17.000	0.000	0.000	-	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	223.518	189.631	109.868	-	109.868

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 07 PE 0207448F: <i>C2ISR TDL</i>	1.505	1.531	1.559	-	1.559	1.587	1.616	-	-	Continuing	Continuing
• APAF 05 Line Item F01500: <i>F-15</i>	46.903	53.211	40.167	-	40.167	20.933	21.310	-	-	Continuing	Continuing
• APAF 05 Line Item F01600: <i>F-16</i>	6.755	8.371	8.525	-	8.525	8.695	8.851	-	-	Continuing	Continuing
• APAF 05 Line Item B00200: <i>B-2A</i>	2.315	0.201	0.206	-	0.206	0.210	0.213	-	-	Continuing	Continuing
• APAF 05 Line Item B01B00: <i>B-1B</i>	0.000	0.000	0.000	-	0.000	0.000	0.000	-	-	Continuing	Continuing

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• OPAF 03 Line Item 834010: <i>General Information Technology</i>	0.177	0.180	1.698	-	1.698	1.701	1.731	-	-	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

The Airborne Networking Directorate provides for common development, integration, and interoperability across the entire airborne network and ensures that data links are procured and maintained as a joint, end-to-end command and control system. Platform acquisition strategies vary by program, but the majority of development and integration is normally accomplished by the weapon system prime contractor.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
TDN Integration	Various	Various : Various	-	91.052	Jan 2019	17.500	Jan 2020	11.851	Jan 2021	-		11.851	Continuing	Continuing	-
TDN Integration - TDL PAM	MIPR	Various : Various	-	5.998	Feb 2019	1.000	Mar 2020	4.998	Feb 2021	-		4.998	Continuing	Continuing	-
High Capacity Backbone (HCB)	C/TBD	Various : Various	-	2.235	Mar 2019	51.000	Mar 2020	32.982	Mar 2021	-		32.982	Continuing	Continuing	-
Agile Comms	Various	Various : Various	-	72.942	Mar 2019	64.212	Apr 2020	25.257	Apr 2021	-		25.257	Continuing	Continuing	-
SFF/DACAS Modernization and SoS Enterprise	Various	Various : Various	-	3.945	Mar 2019	0.903	Jan 2020	8.859	Apr 2021	-		8.859	Continuing	Continuing	-
Applique Technologies for TDLs	Various	Various : Various	-	0.631	Mar 2019	0.000	Mar 2020	-		-		-	Continuing	Continuing	-
Link 16 Evolution (LRS)	Various	Various : Various	-	9.400	Mar 2019	5.260	Mar 2020	-		-		-	Continuing	Continuing	-
Link 16 Enhancements	Various	Various : Various	-	0.000	Apr 2019	24.481	Apr 2020	13.925	Apr 2021	-		13.925	Continuing	Continuing	-
Protected Tactical Waveform (PTW)	C/TBD	Not specified. : TBD	-	23.183	Jun 2019	14.888	Mar 2020	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	209.386		179.244		97.872		-		97.872	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
TDN Integration - DTF	PO	46th Test Squadron : Eglin AFB, FL	-	2.510	Dec 2018	0.500	Jan 2020	1.500	Jan 2021	-		1.500	Continuing	Continuing	-
JINTACCS	C/FFP	Spectrum Comm Inc : Newport News, VA	-	2.371	Feb 2019	4.545	Mar 2020	4.000	Feb 2021	-		4.000	Continuing	Continuing	-
TDN Integration - AFPTU	Various	Various : Various	-	1.724	Sep 2019	2.897	Aug 2020	2.336	Aug 2021	-		2.336	Continuing	Continuing	-
<b>Subtotal</b>			-	6.605		7.942		7.836		-		7.836	Continuing	Continuing	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
TDN Integration PMA - A&AS support - NCCA, Coalition Interoperability, JALN AoA	C/CPAF	Various : Various	-	5.667	Jun 2019	1.000	Dec 2019	3.000	Dec 2020	-		3.000	Continuing	Continuing	-
TDN Integration PMA - FFRDC support - Coalition Interoperability, JALN AoA	C/T&M	MITRE : Bedford, MA	-	1.300	Oct 2018	0.600	Nov 2019	0.600	Sep 2021	-		0.600	Continuing	Continuing	-
TDN Integration PMA - Travel, Government Purchase Cards, etc...DTF, NCCA, Coalition Interoperability, AFPTU, JALN AoA	Various	Various : Various	-	0.500	Sep 2019	0.800	Oct 2019	0.500	Sep 2021	-		0.500	Continuing	Continuing	-
JINTACCS PMA - Travel, Government Purchase Cards, etc...	Various	Various : Various	-	0.060	Sep 2019	0.045	Oct 2019	0.060	Sep 2021	-		0.060	Continuing	Continuing	-
<b>Subtotal</b>			-	7.527		2.445		4.160		-		4.160	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	223.518		189.631		109.868		-		109.868	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b><i>Tactical Data Network Enterprise</i></b>																												
TDN Integration																												
JINTACCS																												
High Capacity Backbone (HCB)																												
Protected Tactical Waveform (PTW)																												
TDL Planning, Analysis, and Monitoring (TDL PAM)																												
Agile Comms																												
Link 16 Enhancement																												
SFF/DACAS Modernization and SoS Enterprise Integration																												
Applique Technology for TDLs																												
Link 16 Evolution																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655050 / <i>TDL System Integration</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Tactical Data Network Enterprise</i></b>				
TDN Integration	1	2019	4	2025
JINTACCS	1	2019	4	2025
High Capacity Backbone (HCB)	1	2019	4	2025
Protected Tactical Waveform (PTW)	2	2019	4	2020
TDL Planning, Analysis, and Monitoring (TDL PAM)	2	2019	4	2025
Agile Comms	1	2019	4	2025
Link 16 Enhancement	1	2019	4	2020
SFF/DACAS Modernization and SoS Enterprise Integration	2	2019	4	2022
Applique Technology for TDLs	1	2019	4	2019
Link 16 Evolution	1	2019	4	2020

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655262 / <i>Family of Gateways</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
655262: <i>Family of Gateways</i>	-	18.810	0.000	22.041	0.000	22.041	50.608	38.943	4.007	13.021	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Family of Gateways provides for the study (acquisitions current and proposed), analysis, enhancement, development, integration, costing, demonstration, test, and evaluation efforts that will allow joint combat forces to exchange information quickly and accurately by bridging discrete airborne, terrestrial, maritime, and space-based C4ISR networks producing operational effects not possible within individual networks. Gateway functions include enabling interoperability between data formats, protocols, and communication mediums. Additionally, gateway functions extend the connectivity range, consolidate data from multiple networks into high capacity links for transmission to key C2ISR nodes, route information between disadvantaged users, and fuse/correlate data from multiple sources to improve accuracy. Gateway functions also provide application hosting, shared data storage, on-demand information access, smart data forwarding, and system monitoring and network management. Funding in this project supports 5th-to-4th Generation Communications Capabilities, and 5th-to-5th Generation efforts and future TDL communications development. Additionally, Family of Gateways will support to enhance existing TDL performance, through upgrades and engineering analysis of system designs. Efforts in this project include waveform, ground, and rapid acquisition activities supporting Air Force requirements for communications bridging across multiple platforms, sources and communication domains.

Activities also include studies, analysis, demonstrations and experiments to support both current program planning/execution and future program planning efforts for Family of Gateways or other applicable platforms.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Tactical Data Network system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<b>Title:</b> 5th-to-4th Generation Gateway	4.915	0.000	22.041	-	22.041
<b>Description:</b> 5th-to-4th Generation Communications Capability facilitates sharing track and sensor data between 5th Generation and 4th Generation aircraft as well as Command and Control (C2) nodes. These capabilities enable interoperability between data formats, protocols, and communication mediums. Additionally, these capabilities extend the connectivity range, consolidate data from multiple networks, domains and sensors into high capacity links for transmission to key C2ISR nodes, route information between disadvantaged users, and correlate data from multiple sources to facilitate early detection and tracking while enabling collaborative targeting. The addition of multi-domain capabilities as a future requirement of the 5th-to-4th Generation					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655262 / <i>Family of Gateways</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>Communications Capability enables track sharing at the tactical edge for the timely execution of ground and airborne target sets. These additional capabilities are a combat force multiplier that enhance total force synergy for target prosecution and weapons employment.</p> <p><b>FY 2020 Plans:</b> -Finalizing RFP for integrating 5th-to-4th Generation Communications Capabilities into the E-3 platforms</p> <p><b>FY 2021 Base Plans:</b> -Will continue integration of 5th to 4th Generation communication Capabilities into the E-3 platform</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Platform funded effort in FY20</p> <p><b>Title:</b> BACN Program of Record</p> <p><b>Description:</b> An Acquisition Decision Memorandum (ADM) was signed 30 March 2018 which establishes the BACN Joint Urgent Operational Need (JUON) as a PoR. This ADM defined the PEO as the Milestone Decision Authority (MDA) and approved entry into the Defense Acquisition System (DAS) as a ACAT III, Post-Milestone C program in the Operations and Support (O&amp;S) phase.</p> <p><b>FY 2020 Plans:</b> -No funds in FY20</p> <p><b>FY 2021 Base Plans:</b> -No funds in FY21</p> <p><b>FY 2021 OCO Plans:</b> No OCO funding</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	13.895	0.000	0.000	0.000	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	18.810	0.000	22.041	0.000	22.041

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655262 / <i>Family of Gateways</i>

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• RDTE 07 PE 0207448F: <i>C2ISR TDL</i>	1.505	1.531	1.559	-	1.559	1.587	1.616	-	-	Continuing	Continuing
• APAF 05 Line Item F01500: <i>F-15</i>	46.903	53.211	40.167	-	40.167	20.933	21.310	-	-	Continuing	Continuing
• APAF 05 Line Item F01600: <i>F-16</i>	6.755	8.371	8.525	-	8.525	8.695	8.851	-	-	Continuing	Continuing
• APAF 05 Line Item B00200: <i>B-2A</i>	2.315	0.201	0.206	-	0.206	0.210	0.213	-	-	Continuing	Continuing
• APAF 05 Line Item B01B00: <i>B-1B</i>	0.000	0.000	0.000	-	0.000	0.000	0.000	-	-	Continuing	Continuing
• OPAF 03 Line Item 834010: <i>General Information Technology</i>	0.177	0.180	1.698	-	1.698	1.701	1.731	-	-	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

The Airborne Networking Directorate provides for common development, integration and interoperability across the entire airborne network and ensures that data links are procured and maintained as a joint, end-to-end, command and control system. Platform acquisition strategies vary by program, but the majority of development and integration is normally accomplished by the weapon system prime contractor. Contract approaches vary by program.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655262 / <i>Family of Gateways</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>5th-to-4th Generation Gateway</b>																												
5th-to-4th Generation Gateway Development	[REDACTED]																											
<b>Battlefield Airborne Communication Node (BACN)</b>																												
BACN	[REDACTED]																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604281F / <i>Tactical Data Networks Enterprise</i>	<b>Project (Number/Name)</b> 655262 / <i>Family of Gateways</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>5th-to-4th Generation Gateway</i></b>				
5th-to-4th Generation Gateway Development	2	2019	3	2021
<b><i>Battlefield Airborne Communication Node (BACN)</i></b>				
BACN	1	2019	4	2019



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604287F / <i>Physical Security Equipment</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	13.893	9.700	6.752	0.000	6.752	10.261	10.443	10.630	10.825	Continuing	Continuing
655120: <i>Physical Security Equipment - SD ED</i>	-	13.893	9.700	6.752	0.000	6.752	10.261	10.443	10.630	10.825	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Integrated Base Defense Security Systems (IBDSS) provides improvements and enhancements, demonstrates, and tests Physical Security Equipment (PSE) systems to include Force Protection. This program supports the protection of tactical, fixed, and nuclear weapons systems, AF personnel and AF facilities. The PSE program is organized to provide PSE RDT&E for Air Force specific needs but as a complement to, and in conjunction with, the PSE RDT&E programs funded by the DOD Physical Security Enterprise and Analysis Group (PSEAG). As such this program will obtain, demonstrate, and test PSE in the same manner and to the same standards and architecture as PSEAG-funded projects to ensure interoperability with PSEAG-developed PSE. In support of PSE, this RDT&E program includes spectrum planning for radio frequency (RF), communication security (cyber), information assurance requirements, integration and interoperability command control & communication (3) platform & components. This Program Element also includes funding for Force Protection Commercial Off The Shelf (FP COTS) market research, evaluation and testing. The FP COTS testing applies to all available technologies (delay, denial, detection, assessment, communication display, access control, power, mobility, and defeat effects) which are considered effective for AF physical security use. This program supports the maintenance and test support at Site C 3 and the Cold Weather Test Site (CWTS), as annotated in DoD Directive 3200.11, listing the 46th Test Wing (TW) as a Major Range and Test facility, conducting developmental and operational testing as the primary mission. Force Protection programs are inherently subject to rapid changes in the operational environment and will retain sufficient Program flexibility to meet changes in location, scope and capability in order to protect Air Force people, facilities and warfighting assets. Defender Multi-Domain Command, Control and Communications (DMDC3) - The DMDC3 initiative will rapidly develop the foundational structure of IBDSS to provide a platform that integrates the computing power, the means of communication, and the tools for situational awareness.

Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Emergent Operational Need (JEON) is a rapid acquisition and deployment capability existing of full kill (detect, track, assess and defeat with various capabilities (fixed, mobile, portable and hand-held.) It is a layered system-of-systems using COTS technologies, integrated via GOTS C2 system.

Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON) supports EUCOM JUON to protect specific strategic assets in overseas theaters of operation from the evolution of small unmanned aerial systems based on low cost, extensive proliferation, and availability in the commercial marketplace. FY17 is Overseas Contingency Operations (OCO) funding.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604287F / <i>Physical Security Equipment</i>	
<p>Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON) in support of the Combined Joint Task Force - Operations INHERENT RESOLVE in CENTCOM. This funding protects assets from the evolution of small UAS systems based on low cost, extensive proliferation and availability in the current market place.</p> <p>Counter-small Unmanned Aircraft Systems (C-sUAS) protection capabilities at downward selected high priority sites.</p> <p>Counter-small Unmanned Aircraft Systems (C-sUAS) protection capabilities for 7th Air Force Urgent Operational Need (UON)</p> <p>Counter-small Unmanned Aircraft Systems (C-sUAS) provides counter-drone full-kill chain capabilities to Air Force installation, while also advancing and exploring existing and new capabilities.</p> <p>Air Base Ground Defense (ABGD) will support all Development testing, Evaluation, Integration, Certification, and proof of concept for Tactical Automated Security Systems (TASS) and other tactical/expeditionary equipment that is required to provide robust force protection capabilities worldwide; flight-line security, aircraft, intelligence, surveillance, and reconnaissance assets, critical infrastructure, sustained sortie generation and air operations, advanced technology force multipliers to include: night vision and thermal imagery equipment, counter sniper/battery capabilities, ground weapons, target acquisition radar, inter operable tactical communications, [required C3 and protective standoff equipment for] wheeled tactical [non-tactical], armored [un-armored] vehicles, tactical sensors systems, integrated and interoperable command control &amp; communication (3) platform &amp; components, and unit/personnel protective field equipment. Additionally, ABGD will support all Development testing, Evaluation, Integration, Certification, and proof of concept for Technology Integration Management (TIM) and associated integration and interoperability efforts.</p> <p>Airbase Air Defense Systems (ABADS) The Air Force Counter-small Unmanned Aircraft System (C-sUAS) program will be the principal USAF program to defend against the emerging and growing small unmanned aerial system threat. This program protects strategic assets vital to national security while bedded down and while on the move. It also protects personnel deployed in theater. Small UASs are inexpensive and commercially available and have been used to target US Service members, Allies and Coalition partners. This threat will evolve continuously as commercially available drone technology and drones advance rapidly. The USAF will be analyzing the evolving threat, and evaluating new capabilities to take on this threat, while also designing an architecture and new systems to bring down life cycle cost so that capability can be fielded to all 180+ AF installations and protect AF assets globally.</p> <p>The Air Force requires Airbase Air Defense Systems (ABADS) RDT&amp;E funding for Counter-small Unmanned Aircraft Systems (C-sUAS) to continue capability development essential to maintain pace with the evolving threat.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver these weapon system capabilities.</p>		

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604287F / <i>Physical Security Equipment</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver Base Physical Security System capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

The FY 2021 funding request was reduced by \$3.3 million for the availability of prior year execution balances.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	14.421	9.700	10.066	0.000	10.066
Current President's Budget	13.893	9.700	6.752	0.000	6.752
Total Adjustments	-0.528	0.000	-3.314	0.000	-3.314
• Congressional General Reductions	-0.007	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.528	0.000			
• Other Adjustments	0.007	0.000	-3.314	0.000	-3.314

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 655120: *Physical Security Equipment - SD ED*

Congressional Add: *Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON)- EUCOM*

Congressional Add: *Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON) - CENTCOM*

Congressional Add Subtotals for Project: 655120

Congressional Add Totals for all Projects

	<b>FY 2019</b>	<b>FY 2020</b>
Congressional Add: <i>Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON)- EUCOM</i>	0.000	-
Congressional Add: <i>Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON) - CENTCOM</i>	0.000	-
Congressional Add Subtotals for Project: 655120	0.000	-
Congressional Add Totals for all Projects	0.000	-

**Change Summary Explanation**

FY 2019 includes \$0.528M transfer for SIBR

FY 2019 funds include \$0.007M MDAP penalty withhold

FY 2021 funding was reduced by \$3.314M for under-execution and inflation

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604287F / <i>Physical Security Equipment</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> IBDSS-1</p> <p><b>Description:</b> IBDSS (Integrated Base Defense Security Systems) qualifies, demonstrates, and tests Physical Security Equipment (PSE) systems to include Force Protection. This continuing effort was previously named Physical Security Equipment.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> IBDSS-1 funding ends in FY19. FY20 is the start of IBDSS-2.</p>		9.978	0.000	0.000
<p><b>Title:</b> IBDSS-2</p> <p><b>Description:</b> IBDSS-2 (Integrated Base Defense Security Systems) qualifies, demonstrates, and tests Physical Security Equipment (PSE) systems to include Force Protection. This continuing effort was previously named Physical Security Equipment.</p> <p><b>FY 2020 Plans:</b> Includes, but not limited to continuing Force Protection Commercial Off The Shelf (COTS) market research, evaluation and testing to address capability gaps and obsolescence. This includes integration and testing to qualify COTS equipment to provide essential upgrades/improvements and state-of the art technology to support integrated based security systems installations worldwide. Type of technologies includes delay/denial/detection/assessment/communication display/access control/power equipment &amp; systems for IBDSS projects.</p> <p>Continue with previous integrated or modified COTS efforts to improve IBDSS physical security equipment</p> <p>Defender Multi-Domain Command, Control and Communications (DMDC3) - The DMDC3 initiative will rapidly develop the foundational structure of IBDSS to provide a platform that integrates the computing power, the means of communication, and the tools for situational awareness.</p> <p><b>FY 2021 Plans:</b> Includes, but not limited to continuing Force Protection Commercial Off The Shelf (COTS) market research, evaluation and testing to address capability gaps and obsolescence. This includes integration and testing to qualify COTS equipment to provide essential upgrades/improvements and state-of the art technology to support integrated based security systems installations</p>		0.000	9.700	6.752

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604287F / <i>Physical Security Equipment</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
worldwide. Type of technologies includes delay/denial/detection/assessment/communication display/access control/power equipment & systems for IBDSS projects.  Continue with previous integrated or modified COTS efforts to improve IBDSS physical security equipment  Defender Multi-Domain Command, Control and Communications (DMDC3) - The DMDC3 initiative will rapidly develop the foundational structure of IBDSS to provide a platform that integrates the computing power, the means of communication, and the tools for situational awareness.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to under execution				
<b>Title:</b> Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Emergent Operational Need (JEON) - STRATCOM  <b>Description:</b> Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Emergent Operational Need (JEON) is a rapid acquisition and deployment capability existing of full kill (detect, track, assess and defeat with various capabilities (fixed, mobile, portable and hand-held.) It is a layered system-of-systems using COTS technologies, integrated via GOTS C2 system.  <b>FY 2020 Plans:</b> N/A  <b>FY 2021 Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A		0.000	0.000	0.000
<b>Title:</b> Counter-small Unmanned Aircraft Systems (C-sUAS) Urgent Operational Need (UON) - 7th Air Force  <b>Description:</b> Delivering rapid acquisition and deployment capability of COTS/GOTS technologies to protect assets from the evolution of Counter-small Unmanned Aircraft Systems (C-sUAS) in the pacific theater.  <b>FY 2020 Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A		0.000	0.000	-
<b>Title:</b> Counter-small Unmanned Aircraft System (C-sUAS) protection capabilities at downward selected high priority sites.		3.915	0.000	-

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)	<b>R-1 Program Element (Number/Name)</b> PE 0604287F I Physical Security Equipment
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
<b>Description:</b> Counter-small Unmanned Aircraft System (C-sUAS) protection capabilities at downward selected high priority sites.  <b>FY 2020 Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	13.893	9.700	6.752

	FY 2019	FY 2020
<b>Congressional Add:</b> Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON)- EUCOM  <b>FY 2019 Accomplishments:</b> N/A: no out year funding.	0.000	-
<b>Congressional Add:</b> Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON) - CENTCOM  <b>FY 2019 Accomplishments:</b> N/A: no out year funding.	0.000	-
<b>Congressional Adds Subtotals</b>	0.000	-

**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 29: Base Physical Security Systems	55.340	185.684	39.601	-	39.601	50.711	51.595	52.524	60.602	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**

AFSFC and Force Protection program office investigates requirements to include new and/or obsolete items. COTS sub-systems, equipment and components are competitively acquired from industry after thorough market research. Equipment for testing is purchased via competitive selection processes via direct purchase orders. For security systems COTS that are required to be qualified for nuclear security environments where industry COTS sources may not be mature, consideration is given to replacement of new items or modification of COTS through the competitive selection procedure as well.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604287F / <i>Physical Security Equipment</i>
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Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Emergent Operational Need (JEON). The Force Protection program office is acquiring COTS sub-systems and equipment for DT/OT as well as minor development of an existing C2 System for integration.

Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON). The Force Protection program office is acquiring COTS sub-systems and equipment in support of EUCOM JUON for DT/OT as well as minor development of an existing C2 System for integration.

Delivery Orders on Indefinite Delivery/Indefinite Quantity contract vehicles or other approved purchase methods are utilized to acquire equipment.

The Force Protection program office is developing new capabilities, updating existing capabilities, exploring and fielding COTS capabilities, primarily, but not exclusively through a Mid-Tier Acquisition program.

Notional strategy to deploy Defender Multi-Domain Command, Control and Communications (DMDC3) and IBDSS of the future. DMDC3 Pathfinder operations at Vindicator and Advantor IDS Systems at various bases.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604287F / <i>Physical Security Equipment</i>	<b>Project (Number/Name)</b> 655120 / <i>Physical Security Equipment - SD ED</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Integrated Base Defense Security Systems (IBDSS-1)	Various	Various : Various	-	3.891		-		-		-		-	Continuing	Continuing	-
Integrated Base Defense Security Systems (IBDSS-2)	Various	Various : Various	-	-		1.881		2.904		-		2.904	Continuing	Continuing	-
Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Emergent Operational Need (JEON) STRATCOM	Various	Various : Various	-	-		-		-		-		-	Continuing	Continuing	-
Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON) EUCOM	MIPR	Various : Various	-	-		-		-		-		-	Continuing	Continuing	-
Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON) CENTCOM	Various	Various : Various	-	-		-		-		-		-	Continuing	Continuing	-
Counter-small Unmanned Aircraft System (C-sUAS) Urgent Operational Need (UON) 7th Air Force	Various	Various : Various	-	-		-		-		-		-	Continuing	Continuing	-
Counter-small Unmanned Aircraft System (C-sUAS) protection capabilities at downward selected high priority sites	Various	Various : Various	-	3.612		-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	7.503		1.881		2.904		-		2.904	Continuing	Continuing	N/A



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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Air Force</b>											<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 3600 / 5						<b>R-1 Program Element (Number/Name)</b> PE 0604287F / <i>Physical Security Equipment</i>					<b>Project (Number/Name)</b> 655120 / <i>Physical Security Equipment - SD ED</i>				

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Integrated Base Defense Security Systems (IBDSS-1)	Various	Various : Various	-	2.360		-		-		-		-	Continuing	Continuing	-
Integrated Base Defense Security Systems (IBDSS-2)	Various	Various : Various	-	-		1.920		2.094		-		2.094	Continuing	Continuing	-
Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON) CENTCOM	Various	Various : Various	-	-		-		-		-		-	Continuing	Continuing	-
Counter-small Unmanned Aircraft Systems (C-sUAS) Urgent Operational Need (UON) 7th Air Force	MIPR	Various : Various	-	-		-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	2.360		1.920		2.094		-		2.094	Continuing	Continuing	N/A

**Remarks**  
The support funding is planned at the above amounts. If the support contracts are less, the available funds will be transitioned to the Product Development line.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Integrated Base Defense Security Systems (IBDSS-1)	PO	TAC-3 : Eglin, FL	-	3.727		-		-		-		-	Continuing	Continuing	-
Integrated Base Defense Security Systems (IBDSS-2)	Various	Various : Various	-	-		5.899		1.754		-		1.754	Continuing	Continuing	-
Counter-small Unmanned Aircraft Systems (C-	PO	TAC-3 : Eglin, FL	-	-		-		-		-		-	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604287F / <i>Physical Security Equipment</i>	<b>Project (Number/Name)</b> 655120 / <i>Physical Security Equipment - SD ED</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost				
sUAS) Joint Emergent Operational Need (JEON) STRATCOM																
Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON) EUCOM	PO	Various : Various	-	-		-		-		-		-	-	Continuing	Continuing	-
Counter-small Unmanned Aircraft Systems (C-sUAS) protection capabilities at downward selected high priority sites	Various	Various : Various	-	0.303		-		-		-		-	-	Continuing	Continuing	-
<b>Subtotal</b>			-	4.030		5.899		1.754		-		1.754	Continuing	Continuing	N/A	
<b>Project Cost Totals</b>			-	13.893		9.700		6.752		-		6.752	Continuing	Continuing	N/A	

**Remarks**  
Various delivery orders will be awarded through out the fiscal year for numerous projects.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604287F / <i>Physical Security Equipment</i>	<b>Project (Number/Name)</b> 655120 / <i>Physical Security Equipment - SD ED</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>FY19 Events</b>	
Integrated Base Defense Security Systems (IBDSS-1)	████████████████████
<b>FY20 Events</b>	
Integrated Base Defense Security Systems (IBDSS-2)	████████████████████
<b>FY21 Events</b>	
Integrated Base Defense Security Systems (IBDSS-2)	████████████████████

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604287F / <i>Physical Security Equipment</i>	<b>Project (Number/Name)</b> 655120 / <i>Physical Security Equipment - SED</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>FY19 Events</i></b>				
Integrated Base Defense Security Systems (IBDSS-1)	1	2019	4	2020
<b><i>FY20 Events</i></b>				
Integrated Base Defense Security Systems (IBDSS-2)	1	2020	4	2021
<b><i>FY21 Events</i></b>				
Integrated Base Defense Security Systems (IBDSS-2)	1	2021	4	2022

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	1,135.693	75.345	45.241	17.280	0.000	17.280	27.386	27.877	28.375	28.898	0.000	1,386.095
655191: <i>SDB Increment II</i>	1,135.693	75.345	45.241	17.280	0.000	17.280	27.386	27.877	28.375	28.898	0.000	1,386.095
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 439

**A. Mission Description and Budget Item Justification**

GBU-53/B Small Diameter Bomb Increment II (SDB II) StormBreaker is a joint interest United States Air Force (USAF) and Department of Navy (DoN) Acquisition Category (ACAT) IC program, with the USAF as the lead service. SDB II addresses the following warfighter requirements: attack moving and stationary targets, adverse weather operations, multiple ordnance carriage, precision munitions capability, reduced munitions footprint, increased weapons effectiveness, minimized potential for collateral damage, reduced susceptibility of munitions to countermeasures, and provides a network-enabled weapon capability via Link-16 and Ultra High Frequency (UHF) weapon data link. SDB II is a key component of the Air Force Global Strike Task Force Concept of Operations (CONOPs). The threshold aircraft for the USAF is the F-15E, and the threshold aircraft for the DoN are the F-35B and F-35C. Objective aircraft include the F-22, F-16, F-35A, B-2, A-10, MQ-9, B-1, B-52, AC-130 and the F/A-18E/F. SDB II is compatible with the Bomb Rack Unit-61 (BRU-61) miniature munitions carriage, Type II carriage systems, the CNU-660/E carriage system, the Common Munitions Built In Test (BIT)/Reprogramming Equipment (CMBRE), and the Joint Mission Planning System (JMPS). SDB II will develop and field a single weapon storage container (USAF) and a dual weapon storage container (DoN).

SDB II completed a competitive Risk Reduction in October 2009 and entered Milestone B Engineering and Manufacturing Development (EMD) in August 2010. A Fixed Price Incentive Firm EMD contract with five options for annual Low Rate Initial Production (LRIP) lots (FY15-FY19) was awarded in August 2010. SDB II received Milestone C approval to enter LRIP in June 2015 and completed an Acquisition Program Baseline update. Contract options for LRIP Lots 1-5 have been exercised. Initial Operational Test and Evaluation (IOT&E) started June 2018 and completed December 2019. Initial Operational Capability (IOC) for the F-15E is scheduled for FY 2020. IOC on the DoN's F-35B and F-35C is scheduled for FY 2022; and is based on the F-35 B/C hardware and software modification schedule. DoN's first production lot (Lot 4/FY19) supports F/A-18E/F IOC.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver SDB II weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	78.091	31.241	17.311	0.000	17.311
Current President's Budget	75.345	45.241	17.280	0.000	17.280
Total Adjustments	-2.746	14.000	-0.031	0.000	-0.031
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	14.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-2.746	0.000			
• Other Adjustments	0.000	0.000	-0.031	0.000	-0.031

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 655191: *SDB Increment II*

Congressional Add: *Precision Navigation*

Congressional Add: *SDB II Tech Refresh*

Congressional Add Subtotals for Project: 655191

Congressional Add Totals for all Projects

	<b>FY 2019</b>	<b>FY 2020</b>
	5.000	4.000
	-	10.000
	5.000	14.000
	5.000	14.000

**Change Summary Explanation**

FY19 funding was reduced by \$2.746M for Small Business Innovation Research (SBIR)

FY20 Congressional Adds (\$4M for Precise Navigation; \$10M for Seeker cost reduction initiative)

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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**Title:** SDB II Development and Engineering Changes

**Description:** Development activities to deliver capabilities in the SDB II Capability Development Document (CDD). Design, develop, integrate, model, test, and qualify engineering changes to SDB II baseline hardware and software to meet emerging threats and to maintain compatibility with external systems. Activities include, but are not limited to, DoD-mandated data link cryptographic modernization, program protection, exportability features, cyber security, advanced guidance, navigation and control, enhanced lethality, precise/advance navigation, and address obsolescence issues and affordability opportunities. Conduct trade studies and concept development for technology refresh redesigns as based on obsolescence forecasts.

	30.320	19.802	5.940
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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>FY 2020 Plans:</b> Complete cryptographic modernization design reviews, test asset builds, and continue weapon data link integration and qualification. Conduct activities for production readiness. Continue collaboration with National Security Agency (NSA) on data link key management. Continue updates for mission planning and Operational Flight Program (OFP) software. Continue development, qualification, and begin testing of engineering changes associated with program protection, exportability, cyber security, enhanced lethality, survivability, threat defeat, software-based capability enhancements, obsolescence, and affordability. Continue integration of SDB II with Command and Control Infrastructure, including Air Operations Center (AOC) integration and Joint Terminal Attack Controller (JTAC) kits. Continue technical order updates to support ongoing OFP development efforts. Continue BRU-61 OFP updates and integration. Lease temporary work space/seating for development and test management personnel, as required to support mission needs.</p> <p><b>FY 2021 Plans:</b> Continue cryptographic modernization weapon data link integration and ground qualification. Conduct activities for production readiness. Continue collaboration with NSA on data link key management. Continue updates for mission planning and OFP software. Conduct all-up-round (AUR) testing.</p> <p>Continue development, qualification, and testing of engineering changes associated with program protection, exportability, cyber security, enhanced lethality, survivability, threat defeat, software-based capability enhancements, obsolescence, and affordability. Continue integration of SDB II with Command and Control Infrastructure, including AOC integration and JTAC kits. Continue technical order updates to support ongoing OFP development efforts. Continue BRU-61 OFP updates and integration. Conduct trade studies and concept development for technology refresh redesigns as required based on obsolescence forecasts.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to majority of data link cryptographic modernization integration, test and qualification hardware having been purchased in FY19 and FY20.</p>				
<p><b>Title:</b> SDB II Integration and Qualification Testing on F-15E</p> <p><b>Description:</b> F-15E Aircraft Integration incorporates tests and targets, Modeling and Simulation (M&amp;S), target lethality, data link, and mission planning. Develop F-15E OFP upgrades to provide the capability to program the weapon with mission planned targets, weapon data link control, and exclusion zone information prior to launch of the weapon. It also allows the aircrew to make in-flight targeting and weapon data link programming if/when required based on employment scenarios.</p> <p>Funding decreased from FY19 following reorganization of major thrust areas.</p> <p><b>FY 2020 Plans:</b></p>		14.114	0.000	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A				
<b>FY 2021 Plans:</b> N/A				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A				
<b>Title:</b> SDB II M-Code		25.911	11.439	11.340
<b>Description:</b> Activities include, but are not limited to, design, development, test and qualification of engineering changes to the SDB II system required for M-Code, and enhanced anti-jam capability. M-Code provides an enhanced anti-jam capability and secures access to military GPS signals. M-Code will provide the ability to operate in increasing adversarial anti-access/area-denial (A2/AD) jamming environments with increased accuracy, better signal acquisition, and enhanced security fetures.				
<b>FY 2020 Plans:</b> Continue activities to provide SDB II with M-Code capabilities for improved anti-jam and secure access to military GPS signals. Complete component and system-level design reviews and continue development, test, and qualification activities for M-Code receiver and associated component integration. Build component and system-level developmental test assets. Update mission planning and threshold aircraft operational flight program (OFF) software to ensure aircraft to weapon integration and transmission of the appropriate M-Code initialization data and crypto keys. Implement engineering change proposals required by GPS Directorate to comply with signal-in-space interface control documents, key management distribution and security requirements.				
<b>FY 2021 Plans:</b> Continue activities to provide SDB II with M-Code capabilities for improved anti-jam and secure access to military GPS signals. Continue development, test, and qualification activities for M-Code receiver and associated component integration. Build component and system-level developmental test assets and conduct ground and flight testing. Update mission planning and threshold aircraft OFF software to ensure aircraft-to-weapon integration and transmission of the appropriate M-Code initialization data and crypto keys. Implement engineering change proposals required by GPS Directorate to comply with signal-in-space interface control documents, key management distribution and security requirements.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decrease was minimal from FY 2020 to FY 2021, and reflects similar planned activities.				
<b>Accomplishments/Planned Programs Subtotals</b>		70.345	31.241	17.280
		<b>FY 2019</b>	<b>FY 2020</b>	
<b>Congressional Add:</b> Precision Navigation		5.000	4.000	



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>
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	FY 2019	FY 2020
<b>FY 2019 Accomplishments:</b> Activities include designing, implementing, and down selecting seeker based navigation algorithms suitable for operation in GPS denied environments. This effort includes designing/ evaluating multiple solutions on existing and planned weapon hardware. The effort is planned in a two phased approach: Phase 1 will design and down select solution while Phase 2 includes flight tests and final qualification.		
<b>FY 2020 Plans:</b> Activities include continuation of work to design, test, implement, and down select seeker based algorithms suitable for operation in a GPS denied environments.		
<b>Congressional Add:</b> SDB II Tech Refresh	-	10.000
<b>FY 2020 Plans:</b> SDB II Tech Refresh thrust will be a multi-year initiative to increase system affordability, protect our ability to produce and operate, and increase weapon value for the warfighter. This thrust includes, but may not be limited to, reducing the cost of the seeker and other components, subsystems, and assemblies within the weapon and associated system-of-systems; mitigating or responding to Diminishing Manufacturing Sources and Material Shortages (DMSMS); solidifying and/or increasing competition within the supplier industrial base; maximizing operational weapon effectiveness and value through capability enhancements and countering emerging threats; and improving supportability, handling, mission planning and human machine interface.		
Conduct Analysis of Alternatives to evaluate best value Engineering Change Proposals (ECPs) to and/or redesign of the seeker and/or other components and subsystems within the weapon; evaluate supplier and assembly cost reduction; develop a technology roadmap for system affordability, producibility and operational improvements; analyze system requirements and conduct a Systems Requirements Review; mature key technologies and reduce risk for preferred alternatives; and develop and test software enhancements to provide near and/or longer term performance enhancements to maximize warfighter value for fielded or future weapons. Work may also extend beyond the weapon into the SDB II system-of-systems to improve operational effectiveness, operator reliability, aircraft integration, mission planning and human machine interface.		
<b>Congressional Adds Subtotals</b>	5.000	14.000

**D. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• MPAF 02 Line Item SDB002: <i>Small Diameter Bomb II</i>	100.861	212.434	273.436	-	273.436	308.116	321.869	279.530	223.550	489.974	2,209.770
• RDTE 05 PE 0604329N: <i>Small Diameter Bomb II</i>	57.397	46.129	55.473	-	55.473	59.351	50.642	46.091	47.013	0.000	362.096

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• WPN Line Item 223800: <i>Small Diameter Bomb II</i>	88.772	118.466	79.054	-	79.054	80.918	82.945	84.684	86.456	301.856	923.151

**Remarks**

DoN RDT&E funds include F-35B and F-35C Integration and Support Cost.

**E. Acquisition Strategy**

The SDB II Engineering and Manufacturing Development (EMD) contract was awarded using competitive procedures. At the completion of the 42-month Risk Reduction phase in October 2009, one contractor was selected in April 2010 and awarded the EMD contract in August 2010. The EMD contract is a Fixed-Price Incentive Firm (FPIF) contract with priced production options for the first five production lots. SDB II production Lots 1-3 are FPIF. Production Lots 4-5 are firm fixed price. The Government is buying the SDB II based on the contractor System Performance Specification (SPS) which has been approved by the Government. The contractor is accountable for system performance as defined in the SPS and a system warranty as defined in the EMD contract and follow-on production contracts. Accordingly, the contractor is accountable to the Government for the design of the weapon system, as well as the planning and execution of the Development Test and Evaluation (DT&E) program to verify system performance. The Government formally arranges and funds the use of Government flight test support for DT&E and OT&E.

In September 2017, the Government awarded a sole source indefinite delivery indefinite quantity (IDIQ) contract to Raytheon Missile Systems to design, develop, integrate, model, test, and qualify engineering changes to SDB II baseline hardware and software to meet emerging threats and to maintain compatibility with external systems. Activities include, but are not limited to M-Code GPS, data link cryptographic modernization, program protection, exportability features, cyber security, advanced guidance, navigation and control, enhanced lethality, and address obsolescence issues and affordability opportunities. These SDB II design changes are scheduled to begin cut-in production in FY 2022 (Lot 8) as technology is available.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB)</i> - EMD	<b>Project (Number/Name)</b> 655191 / <i>SDB Increment II</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Risk Reduction Contract 1	C/CPFF	Boeing : St. Louis, MO	151.922	-		-		-		-		-	0.000	151.922	-
Risk Reduction Contract 2	C/CPFF	Raytheon : Tucson, AZ	150.800	-		-		-		-		-	0.000	150.800	-
EMD Contract	C/FPIF	Raytheon : Tucson, AZ	460.169	-		-		-		-		-	0.000	460.169	-
Engineering Changes & Technical Support	SS/ Various	Raytheon : Tucson, AZ	107.408	46.130	Dec 2018	29.769	Dec 2019	3.100	Dec 2020	-		3.100	21.262	207.669	136.520
M-Code Integration	SS/ Various	Raytheon : Tucson, AZ	23.801	25.911	Jan 2019	11.439	Mar 2020	11.340	Mar 2021	-		11.340	43.393	115.884	109.437
IMPACT High Pressure Air Compressor System	SS/FFP	Boeing : St. Charles, MO	3.175	-		-		-		-		-	0.000	3.175	-
F-15E Integration and Test Support	SS/ Various	Boeing : St. Louis, MO	50.433	1.683	Jun 2019	1.500	Jun 2020	1.000	Jun 2021	-		1.000	0.724	55.340	49.762
BRU-61/A Integration and Test Support	SS/ Various	Boeing : St. Louis, MO	8.529	-		-		-		-		-	0.000	8.529	-
Mission Planning	Various	Various : Various	5.732	-		-		-		-		-	0.000	5.732	5.832
Data Link Integration & Support	Various	Various : Various	3.004	-		-		-		-		-	0.000	3.004	-
System Performance & Lethality	Various	Various : Various	38.950	-		-		-		-		-	0.000	38.950	39.334
Other Product Development	Various	Various : Various	11.796	-		-		0.280	Mar 2021	-		0.280	36.791	48.867	69.594
<b>Subtotal</b>			1,015.719	73.724		42.708		15.720		-		15.720	102.170	1,250.041	N/A

**Remarks**  
 Engineering Changes: upgrades to SDB II baseline hardware/software to meet emerging threats and to maintain compatibility with external systems. Activities include, but are not limited to, data link cryptographic modernization, program protection, exportability, cyber security, advanced guidance, navigation and control, enhanced lethality, and address obsolescence issues and affordability opportunities.  
 Other Product Development: upgrades to baseline hardware/software to support F-35 Integration

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB)</i> - EMD	<b>Project (Number/Name)</b> 655191 / <i>SDB Increment II</i>
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Other Government Costs	Various	Various : Various	5.855	0.521	Apr 2019	0.543	Apr 2020	0.565	Apr 2021	-		0.565	0.736	8.220	8.201
<b>Subtotal</b>			5.855	0.521		0.543		0.565		-		0.565	0.736	8.220	N/A

**Remarks**  
Other Gov't Costs: Command & Control Infrastructure Integration subject matter expert (SME) support

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
DT&E	PO	96th Test Wing : Eglin AFB, FL	34.410	-		1.000	Dec 2019	0.000		-		0.000	0.000	35.410	33.725
DT&E: UTTR, WSMR	Various	Various : Various	10.304	-		-		-		-		-	0.000	10.304	-
Targets	Various	Various : Various	25.648	-		-		-		-		-	0.000	25.648	-
Other Test Support	Various	Various : Various	9.263	-		-		-		-		-	0.000	9.263	11.896
<b>Subtotal</b>			79.625	-		1.000		0.000		-		0.000	0.000	80.625	N/A

**Remarks**  
UTTR: Utah Test and Training Range  
WSMR: White Sands Missile Range

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Engineering Professional Administrative Support Services	Various	Various : Eglin AFB, FL	23.258	0.750	Jun 2019	0.750	Jun 2020	0.750	Jun 2021	-		0.750	1.500	27.008	25.508

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB)</i> - EMD	<b>Project (Number/Name)</b> 655191 / <i>SDB Increment II</i>
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration (PMA)	Various	Various : Eglin AFB, FL	11.236	0.350	Oct 2018	0.240	Oct 2019	0.245	Oct 2020	-		0.245	0.264	12.335	11.536
<b>Subtotal</b>			34.494	1.100		0.990		0.995		-		0.995	1.764	39.343	N/A

**Remarks**  
 EPASS: Engineering, Professional & Administrative Support Services  
 PMA: Other government costs (travel, Government Purchase Card (GPC), equipment supplies, and IT support)

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	1,135.693	75.345	45.241	17.280	-	17.280	104.670	1,378.229	N/A

**Remarks**  
 Engineering Changes: upgrades to SDB II baseline hardware/software to meet emerging threats, maintain compatibility with external systems and improve system performance. Activities include, but are not limited to, data link cryptographic modernization, program protection, exportability, cyber security, advanced guidance, navigation and control, enhanced lethality, and address obsolescence issues and affordability opportunities.  
  
 Other Product Development: upgrades to baseline hardware/software to support F-35 Integration  
  
 FINANCIAL PERFORMANCE: SDB II is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. However, the SDB II LRIP contract is a FPIF contract with progress payments. A percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB)</i> - EMD	<b>Project (Number/Name)</b> 655191 / <i>SDB Increment II</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>SDB Increment II</i></b>																												
IOT&E on F-15E																												
F-15E Required Assets Available (RAA)																												
M-Code Integration & Testing																												
Data Link Crypto Mod Integration & Testing																												
Integration & Testing on Threshold F-35B/C																												
Precision Navigation																												
SDB II Tech Refresh																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604329F / <i>Small Diameter Bomb (SDB)</i> - EMD	<b>Project (Number/Name)</b> 655191 / <i>SDB Increment II</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>SDB Increment II</i></b>				
IOT&E on F-15E	1	2019	1	2020
F-15E Required Assets Available (RAA)	4	2019	4	2020
M-Code Integration & Testing	1	2019	2	2023
Data Link Crypto Mod Integration & Testing	1	2019	4	2021
Integration & Testing on Threshold F-35B/C	1	2019	4	2022
Precision Navigation	4	2019	3	2022
SDB II Tech Refresh	4	2020	3	2022

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604429F / <i>Airborne Electronic Attack</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	5.948	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.948
655192: <i>Network &amp; Sys -of-Sys Dev</i>	-	5.948	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.948
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Airborne Electronic Attack (AEA) System of Systems (SoS) project concentrates on the overall systems engineering, modeling and simulation, architecture and network requirements development, effectiveness assessment and requirements allocation to components and component systems of the emerging Electromagnetic Spectrum (EMS) Superiority Enterprise family. Funding supports establishment and use of virtual test capabilities for system of systems effectiveness testing/evaluation for EMS Superiority, instantiating updated Defense Planning Guidance (DPG) scenarios into digital representations suitable for supporting modeling and simulation, conducting studies and technology risk mitigation demonstrations for potential EMS Superiority components and EMS Battle Management, development planning, planning for and supporting OSD or AF directed analysis of alternatives (including working group support), and the development and maintenance of the Air Force electronic warfare capability investment strategy. These efforts are important in the development of EMS defense and attack capabilities to support Air Force and joint operations in in line with the National Defense Strategy. This project will address and resolve AF gaps/opportunities across the EW/EMS Superiority Enterprise.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver AEA SoS and EMS Superiority Enterprise capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b><u>FY 2019</u></b>	<b><u>FY 2020</u></b>	<b><u>FY 2021 Base</u></b>	<b><u>FY 2021 OCO</u></b>	<b><u>FY 2021 Total</u></b>
Previous President's Budget	6.153	0.002	0.000	0.000	0.000
Current President's Budget	5.948	0.000	0.000	0.000	0.000
Total Adjustments	-0.205	-0.002	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.205	0.000			
• Other Adjustments	0.000	-0.002	0.000	0.000	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604429F / <i>Airborne Electronic Attack</i>		
<b><u>Change Summary Explanation</u></b> No significant changes				
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> AEA System Engineering Studies & Technology Transition <b>Description:</b> Apply systems engineering rigor to analyze and recommend improvements/changes to Air Force Airborne Electronic Attack (AEA) System of Systems (SoS) and Electronic Warfare (EW)/Electromagnetic Spectrum (EMS) Superiority requirements, designs, and operational concepts. Assess operational effectiveness of multiple EMS Superiority systems in both offensive and defensive roles. <b>FY 2020 Plans:</b> N/A <b>FY 2021 Plans:</b> N/A <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A		2.534	0.000	0.000
<b>Title:</b> AEA Capability Planning <b>Description:</b> Provide capability planning to the Air Force Electronic Warfare (EW), Airborne Electronic Attack (AEA) System of Systems (SoS) and emerging EW/EMS Superiority portfolio and conduct constructive and virtual modeling and simulation and analysis management. <b>FY 2020 Plans:</b> N/A <b>FY 2021 Plans:</b> N/A <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A		3.414	0.000	0.000
<b>Accomplishments/Planned Programs Subtotals</b>		5.948	0.000	0.000
<b>D. Other Program Funding Summary (\$ in Millions)</b> N/A				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604429F / <i>Airborne Electronic Attack</i>
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**D. Other Program Funding Summary (\$ in Millions)**

**Remarks**

**E. Acquisition Strategy**

FY19 plans to use funds on multiple existing IDIQ contracts.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604429F / Airborne Electronic Attack	<b>Project (Number/Name)</b> 655192 / Network & Sys -of-Sys Dev
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	0.000	0.000	-
AEA system of systems engineering	C/CPFF	Various : Various	-	2.434	Dec 2018	0.000		-		-		-	0.000	2.434	-
AF EW Capability/ Development Planning	MIPR	Various : Various	-	3.114	Dec 2018	-		-		-		-	0.000	3.114	-
<b>Subtotal</b>			-	5.548		0.000		-		-		-	0.000	5.548	N/A

**Remarks**  
Includes system of systems engineering; architecture development; network requirements planning; requirements refinement and development; EW assessments, including Air Force Electronic Warfare Capability Investment Strategy (AFEWCIS) roadmap development, maintenance & assessments; technology risk mitigation, DoD scenario initiation & distribution; conduct of Joint AoA (working group support and organic civilian salaries); engineering and test planning; capability planning for AF EW portfolio; conduct of constructive/virtual modeling simulation and analysis.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	0.000	0.000	-
Mission Support	Various	Various : Various	-	0.400	Dec 2018	-		-		-		-	0.000	0.400	-
<b>Subtotal</b>			-	0.400		-		-		-		-	0.000	0.400	N/A

**Remarks**  
Element includes miscellaneous support to projects. Costs include travel and unique security expenses.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	-	5.948	0.000	-	-	-	0.000	5.948	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604429F / Airborne Electronic Attack	<b>Project (Number/Name)</b> 655192 / Network & Sys -of-Sys Dev
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Airborne Electronic Attack</i></b>																												
DoD Planning Scenarios Suppressor updates																												
Support EW Assessments																												
AEA SoS Suppressor Improvements																												
AF EW Investment Strategy																												
Conduct Joint AEA Development and Planning																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604429F / <i>Airborne Electronic Attack</i>	<b>Project (Number/Name)</b> 655192 / <i>Network &amp; Sys -of-Sys Dev</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Airborne Electronic Attack</i></b>				
DoD Planning Scenarios Suppressor updates	1	2019	4	2019
Support EW Assessments	1	2019	2	2020
AEA SoS Suppressor Improvements	1	2019	4	2019
AF EW Investment Strategy	1	2019	4	2019
Conduct Joint AEA Development and Planning	1	2019	4	2019

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	44.788	28.043	23.076	0.000	23.076	9.183	6.705	6.825	6.950	Continuing	Continuing
653133: <i>Bombs &amp; Fuzes</i>	-	39.742	19.054	18.011	0.000	18.011	4.010	1.440	1.466	1.492	Continuing	Continuing
655361: <i>Stores-Aircraft Interface</i>	-	5.046	8.989	5.065	0.000	5.065	5.173	5.265	5.359	5.458	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

The Armament Ordnance Development program provides for the initial and continuing development of weapons, munitions, and munitions equipment for aircraft integration, support, and operational use. This program develops, characterizes, and improves current, future, and legacy munitions, ammunitions, and subsystems.

653133: The Bombs & Fuzes project improves conventional weapons/munitions (kinetic and non-kinetic), fuzes, and height-of-burst sensors (HOBS), and develops and integrates complementary position, navigation, and timing (PNT) capabilities (i.e. GPS, non-GPS, optical, passive, active, etc.). This project also provides an opportunity to quickly insert emerging technologies into existing and developing aircraft munitions and fuzes. Bombs & Fuzes provides research, development, and testing of conventional warheads, fuzing, HOBS modifications, and anti-personnel anti-materiel (APAM) weapons to improve lethality against area, mobile, hard and deeply buried, and fixed targets. This project provides for the development and testing necessary to provide a suitable manufacturing base of conventional warheads, fuzes, HOBS, and munitions materiel handling equipment (MMHE).

655361: The Stores-Aircraft Interface project is home to the Universal Armament Interface (UAI). UAI is the Air Force's common standard aircraft/weapon interface and is an acquisition requirement, to be used by all weapons and combat aircraft as practicable. The UAI program continues development and maintenance of the standardized interface including mission planning components. Users include Army and Navy customers. The UAI program office is also responsible for development, enhancement, and maintenance of the standard to support coalition, allied, and joint interoperability efforts for weapons-platform interface. These responsibilities include acquisition, upgrade, repair and provision of UAI certification tools, and implementation support to US Air Force, Army, Navy and allied aircraft and weapons systems. UAI provides cost/schedule savings over traditional integration efforts. This is accomplished by enabling integration of weapons independent of aircraft Operational Flight Programs (OFP) cycles.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Armament/Ordnance Development weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in Program Elements 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	49.590	28.043	6.197	0.000	6.197
Current President's Budget	44.788	28.043	23.076	0.000	23.076
Total Adjustments	-4.802	0.000	16.879	0.000	16.879
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-3.260	0.000			
• SBIR/STTR Transfer	-1.542	0.000			
• Other Adjustments	0.000	0.000	16.879	0.000	16.879

**Change Summary Explanation**

FY19: Reprogrammings of -\$8M and +\$4.740 were accomplished to balance resource requirements among the Cockpit-selectable Height of Burst Sensor (C-HOBS), M-Code, and the Advanced Medium Range Air-to-Air Missile (AMRAAM) programs.

FY21: AF provided C-HOBS \$21M to complete Engineering and Manufacturing Development.

The FY 2021 Armament/Ordnance funding request was reduced by \$4.1M to account for the availability of prior year execution balances.



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>				<b>Project (Number/Name)</b> 653133 / <i>Bombs &amp; Fuzes</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
653133: <i>Bombs &amp; Fuzes</i>	-	39.742	19.054	18.011	0.000	18.011	4.010	1.440	1.466	1.492	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Bombs & Fuzes project improves conventional weapons/munitions (kinetic and non-kinetic), fuzes, and height-of-burst sensors (HOBS), and develops and integrates complementary position, navigation, and timing (PNT) capabilities (i.e. GPS, non-GPS, optical, passive, active, etc.). This project also provides an opportunity to quickly insert emerging technologies into existing and developing aircraft munitions and fuzes. Bombs & Fuzes provides research, development, and testing of conventional warheads, fuzing, HOBS modifications, and anti-personnel anti-materiel (APAM) weapons to improve lethality against area, mobile, hard and deeply buried, and fixed targets. This project provides for the development and testing necessary to provide a suitable manufacturing base of conventional warheads, fuzes, HOBS, and munitions materiel handling equipment (MMHE).

- Munitions Materiel Handling Equipment (MMHE): MMHE is a continuing project to develop and improve the standardization and commonality of munitions handling and armament equipment to preclude duplication. Efforts are primarily the study, design, and development of MMHE and armament control systems; however, support may be provided to other functional areas as requested. Procurement will be performed and funded by the applicable weapons system project.

- Medium Caliber Ammunition project assesses, refines, and develops medium caliber ammunition, to include, but not limited to, conducting 25mm (F-35) qualification testing, comparative testing, and mitigating ammunition inventory health issues.

- Insensitive Munitions (IM) project supports AF IM strategic planning to achieve IM compliance IAW U.S. Code, Title 10, Subtitle A, Part N, Chapter 141, Section 2389, ensuring safety regarding insensitive munitions. Models and validates munition performance, integrates less sensitive explosive fills, addresses IM explosive fill deficiencies, and develops bomb case modifications to improve the response of conventional weapons to unplanned stimuli. This project explores and develops IM solutions.

- Next Generation Area Attack Weapons (NGAAWs) are a family of unitary area attack weapon capabilities to meet the DoD policy regarding cluster munitions and unintended harm to civilians. They consist of BLU-134/B and BLU-136/B warheads with a height of burst sensor. BLU-134/B Improved Lethality Warhead (ILW), NGAAW Increment I, is a near-term solution for area attack as an anti-personnel anti-materiel (APAM) weapon that improves lethality using a 500 lb warhead design and any variants. The BLU-136/B NGAAW Increment II continues development to provide significantly increased capability and lethality against area targets as an APAM weapon. This effort is being executed using an accelerated acquisition strategy to study, design, develop, and test a 2,000 lb unitary warhead design and any variants based on target sets.

- DSU-43/B Cockpit-selectable Height-Of-Burst Sensor (C-HOBS): The C-HOBS will be a replacement for the current DSU-33D/B proximity sensor. C-HOBS will replace the single factory height-of-burst setting with the addition of multiple height-of-burst options selectable via both manual switches and a cockpit interface. These selection

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 653133 / <i>Bombs &amp; Fuzes</i>
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options allow flexibility during flight to address a wide array of targets. The C-HOBS is intended to interface with Combat Air Forces (CAF) aircraft and provide proximity height-of-burst functionality to general and special purpose weapons (to include NGAAWs).

- Joint Air-to-Ground Missile for Fixed Wing Aircraft (JAGM-F) is an improvement to the Army-led JAGM, which will allow the missile to be ejected from fixed wing aircraft in order to eliminate time sensitive moving targets and high value covered/sheltered targets. JAGM-F will be able to combat adverse weather/low visibility battlefield and countermeasure environments as well as austere communication environments. JAGM-F will have the ability to engage multiple target types near-simultaneously in multiple engagement modes. Efforts include but are not limited to capability demonstration design, testing, and qualification, and manufacture/build components to production standards. Intent is to investigate meeting all BRU-55, BRU-70, and BRU-61 environments.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><b>Title:</b> Munitions Materiel Handling Equipment (MMHE)</p> <p><b>Description:</b> Armament Standardization/Control/Munitions Materiel Handling Equipment (MMHE) is a continuing project to develop and improve the standardization and commonality of munitions handling and armament equipment to preclude duplication. Efforts are primarily the study, design, and development of MMHE and armament control systems; however, support may be provided to other functional areas as requested. Procurement will be performed and funded by the applicable weapons system project.</p> <p><b>FY 2020 Plans:</b> Continue MMHE support projects to include engineering, drafting, proof load, technical data, and safety authorizations. Fabricate prototypes for test and evaluation purposes. Continue first article equipment fabrications for drafting verification and delivery to Air Force units for additional test and evaluation. Provide support to all system program offices with new weapons and aircraft configurations, as needed. Continue support to the F-35 with designs and manufacturing of equipment to aid safe munitions loading and handling of various pylons and adapters. Continue to support the B-21 program office with evaluations and recommendations for equipment to aid safe munitions loading and handling of various pylons and adapters. Continue support to the Defense Advanced Research Projects Agency (DARPA) with designs and manufacturing of equipment to aid safe munitions loading and handling of hypersonic weapons. Continue support for Air Force Research Laboratory on future munition concept demonstrators. Continue support and sustainment engineering of all previously existing items developed by the MMHE program office. Continue to provide MMHE Sustainment office at Robins AFB, GA, with engineering support.</p> <p><b>FY 2021 Base Plans:</b> Continue MMHE support projects to include engineering, drafting, proof load, technical data, and safety authorizations. Fabricate prototypes for test and evaluation purposes. Continue first article equipment fabrications for drafting verification and delivery to Air Force units for additional test and evaluation. Provide</p>	0.667	0.714	0.722	-	0.722

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 653133 / <i>Bombs &amp; Fuzes</i>			
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p>support to all system program offices with new weapons and aircraft configurations, as needed. Continue support to the F-35 with designs and manufacturing of equipment to aid safe munitions loading and handling of various pylons and adapters. Continue to support the B-21 program office with evaluations and recommendations for equipment to aid safe munitions loading and handling of various pylons and adapters. Continue support to DARPA with designs and manufacturing of equipment to aid safe munitions loading and handling of hypersonic weapons. Continue support for Air Force Research Laboratory on future munition concept demonstrators. Continue support and sustainment engineering of all previously existing items developed by the MMHE program office. Continue to provide MMHE Sustainment office at Robins AFB, GA, with engineering support.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increase is minimal.</p>					
<p><b>Title:</b> Medium Caliber Ammunition</p> <p><b>Description:</b> The Medium Caliber Ammunition efforts support the warfighter's medium caliber ammunition research, development, test, and evaluation (RDT&amp;E) requirements, DoN/USAF collaboration for the medium caliber family of ammunition, foreign comparative testing, inventory health challenges, procurement of ammunition, and other emerging technologies.</p> <p><b>FY 2020 Plans:</b> Continue to provide engineering and technical support for PGU-48/B rounds as well as further comparative testing/EMD of alternative products/sources. Initiate development of the 30mm replacement round. Assess and mitigate Medium Caliber ammunition inventory health challenges.</p> <p><b>FY 2021 Base Plans:</b> Continue to provide engineering and technical support for PGU-48/B rounds as well as further comparative testing/EMD of alternative products/sources. Initiate development of the 30mm replacement round. Assess and mitigate Medium Caliber ammunition inventory health challenges.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	0.100	0.100	0.100	-	0.100
<p><b>Title:</b> Insensitive Munitions (IM) and Emerging Technology</p> <p><b>Description:</b> Model and validate current and Emerging Energetics munition performance; assess and correct IM deficiencies; explore and develop new IM and Energetics technology; conduct strategic IM and Emerging</p>	0.300	0.300	0.300	-	0.300

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 653133 / <i>Bombs &amp; Fuzes</i>			
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>					
Energetics planning for the AF; support Joint Service IM efforts; provide technical guidance and test expertise to AF IM and Emerging Energetics programs.					
<b>FY 2020 Plans:</b> Execute the Insensitive Munitions Strategic Plan (IMSP) and Plan of Action and Milestones (POAM). Begin Phase II of the Liner project for the BLU-117 which includes engineering passive venting using IM features. Once features are implemented, qualification testing will take place.					
<b>FY 2021 Base Plans:</b> Execute the Insensitive Munitions Strategic Plan (IMSP) and Plan of Action and Milestones (POAM). Continue Phase II of the Liner project for the BLU-117 which includes engineering passive venting using IM features. Once features are implemented, qualification testing will take place.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A					
<b>Title:</b> BLU-136/B Next Generation Area Attack Weapon Increment II					
<b>Description:</b> The Next Generation Area Attack Weapon Increment II (NGAAW II) continues development of anti-personnel anti-materiel (APAM) weapons to improve lethality against area targets via an accelerated acquisition strategy. This effort studies, designs, develops, and tests a warhead design and any variants which significantly improve lethality against APAM while meeting current DoD policy on cluster munitions and unintended harm to civilians.					
<b>FY 2020 Plans:</b> N/A					
<b>FY 2021 Base Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A					
<b>Title:</b> Cockpit-Selectable Height-Of-Burst Sensor (C-HOBS)					
<b>Description:</b> DSU-43/B Cockpit-selectable Height-Of-Burst Sensor (C-HOBS). The C-HOBS will be a replacement for the legacy DSU-33D/B proximity sensor. C-HOBS will replace the single factory height-of-burst setting with the addition of multiple height-of-burst options selectable via both manual switches and a cockpit					
	2.819	0.000	0.000	-	0.000
	14.362	1.761	16.889	-	16.889

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 653133 / <i>Bombs &amp; Fuzes</i>			
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>					
interface. These selection options allow flexibility during flight to address a wide array of targets. The C-HOBS is intended to interface with the weapon via the cockpit and provide a cockpit-selectable proximity function for general and special purpose weapons (to include NGAAWs).					
<b>FY 2020 Plans:</b> Continue to mature development; design and qualification tests; and integration work. Conduct government/industry reviews working towards completion of Milestone C efforts. Evaluate production representative articles and complete Initial Product Baseline and Product Support Plan. Complete a CDR Assessment based on test results for the Milestone Decision Authority (MDA) in preparation of a LRIP Production Decision with a Full Rate Production Decision in FY21.					
<b>FY 2021 Base Plans:</b> Complete design and qualification tests; and integration work. Conduct government/industry reviews working towards completion of Milestone C efforts. Start LRIP and First Article Acceptance Testing with a Full-Rate Production Decision. Pending MDA approval of FRP, will start full-rate production.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased due to added AF funding to complete C-HOBS Engineering and Manufacturing Development.					
<b>Title:</b> M-Code Receiver Development					
<b>Description:</b> Description: M-Code/EAJ receivers provide an enhanced anti-jam capability. M-Code/EAJ receivers provide the capability to operate in increasing adversarial A2/AD jamming environment. M-Code/EAJ receivers also provide increased accuracy, better signal acquisition, and advanced security.					
<b>FY 2020 Plans:</b> N/A					
<b>FY 2021 Base Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A					
<b>Title:</b> Joint Air-to-Ground Missile for Fixed Wing (JAGM-F)					
<b>Description:</b> Joint Air-to-Ground Missile for Fixed Wing Aircraft (JAGM-F) is an improvement to the Army-led JAGM, which will allow the missile to be ejected from fixed wing aircraft in order to eliminate time sensitive					
	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
	4.469	0.000	0.000	-	0.000
	17.025	16.179	0.000	-	0.000

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 653133 / <i>Bombs &amp; Fuzes</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>moving targets and high value covered/sheltered targets. JAGM-F will be able to combat adverse weather/low visibility battlefield and countermeasure environments as well as austere communication environments. JAGM-F will have the ability to engage multiple targets types near-simultaneously in multiple engagement modes. Efforts include but are not limited to capability demonstration design, testing, and qualification, and manufacture/build components to production standards. Intent is to investigate meeting all BRU-55, BRU-70, and BRU-61 environments.</p> <p><b>FY 2020 Plans:</b> Continue to model the design and build, Jettison and Capture Analysis, Mechanical Design, Electronic Design and Testing, Electrical Packaging, software design and code development, weapons system integration, aircraft systems integration, test vehicle design and build, and test vehicle flight planning. Purchase additional government furnished equipment (GFE) and flight test support.</p> <p><b>FY 2021 Base Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to evolving USAF requirements.</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	39.742	19.054	18.011	-	18.011

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• PAAF 01 Line Item 353020: <i>General Purpose Bombs</i>	811.170	631.194	0.000	369.566	369.566	394.673	692.700	414.356	370.988	Continuing	Continuing
• PAAF 01 Line Item 356120: <i>Fuzes</i>	180.272	154.214	40.983	107.855	148.838	223.309	188.781	105.411	142.917	Continuing	Continuing
• PAAF 01 Line Item 352010: <i>Cartridges</i>	188.227	193.091	123.365	40.434	163.799	161.666	145.812	109.608	122.330	Continuing	Continuing
<b>Remarks</b>	N/A										

**D. Acquisition Strategy**  
- Fuzes (including C-HOBS) is a continuing effort with most activities performed through contracted services.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 653133 / <i>Bombs &amp; Fuzes</i>
<p>- Munitions Materiel Handling Equipment (MMHE) project activities are performed in-house with limited technical and analysis contract support.</p> <p>- Medium Caliber Ammunition project activities are performed in-house with technical and analysis contract support, organic government test support, and possible contracted services (small contracts).</p> <p>- Insensitive Munitions project activities are performed in-house with limited technical and analysis contract support.</p> <p>- The BLU-136/B NGAAW Inc II warhead design program will implement an accelerated acquisition program strategy. This strategy includes rapid development and prototyping of a warhead design resulting in a final, validated Technical Data Package (TDP). The TDP will be used to compete for initial production and follow on procurement to meet the warfighter requirement. The NGAAW program will continue to evaluate product improvements.</p> <p>- Joint Air-to-Ground Missile for Fixed Wing Aircraft (JAGM-F) utilizes the Defense Ordnance Technology Consortium (DOTC) contract combined with modeling and simulation contract support and government test support.</p>		

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 653133 / <i>Bombs &amp; Fuzes</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
IM	Various	Various : TBD	-	0.300	Mar 2019	0.300	Mar 2020	0.300	Mar 2021	-		0.300	Continuing	Continuing	-
MMHE - Prototypes	Various	Prototype Fabrication Shop : Eglin AFB, FL	-	0.198	Apr 2019	0.134	Apr 2020	0.172	Apr 2021	-		0.172	Continuing	Continuing	-
BLU-136 NGAAW Concept Development	Various	Various : Eglin AFB, FL	-	2.819		-		-		-		-	Continuing	Continuing	-
CHOBS - HW/SW	C/Various	Various : Eglin AFB, FL	-	13.112	Mar 2020	0.000	Jan 2020	6.574	Oct 2020	-		6.574	Continuing	Continuing	-
JAGM-F	C/FFP	DOTC : Huntsville, AL	-	16.202	Jun 2019	10.668	Mar 2020	-		-		-	Continuing	Continuing	-
M-Code Receiver Development	Various	Boeing: : St. Louis, MO	-	4.469	May 2019	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	37.100		11.102		7.046		-		7.046	Continuing	Continuing	N/A

**Remarks**  
NGAAW concept development continues.

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
MMHE - Shipping/Supplies	Various	MMHE Program Office : Eglin AFB, FL	-	0.019	Mar 2019	0.130	Mar 2020	0.100	Mar 2021	-		0.100	Continuing	Continuing	-
JAGM-F - Test Vehicles	Various	Army : Huntsville, AL	-	0.000		0.880	Jun 2020	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.019		1.010		0.100		-		0.100	Continuing	Continuing	N/A



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / Armament/Ordnance Development	<b>Project (Number/Name)</b> 653133 / Bombs & Fuzes
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
BLU-136 ILW - Test and Evaluation	PO	Various : Various	-	-		-		-		-		-	Continuing	Continuing	6.530
CHOBS - Test and Evaluation	C/Various	Various : Various	-	0.915	May 2020	1.555	Aug 2020	9.680	Oct 2020	-		9.680	Continuing	Continuing	-
MMHE - Test Support	PO	96 TW : Eglin AFB, FL	-	0.020	Apr 2019	0.050	Nov 2019	0.050	Nov 2020	-		0.050	Continuing	Continuing	-
JAGM-F - Test Support	Various	Various : Various	-	0.101	Nov 2019	3.878	Oct 2020	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	1.036		5.483		9.730		-		9.730	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Medium Caliber - PMA	Various	Various : Eglin AFB, FL	-	0.100	Jun 2019	0.100	Jun 2020	0.100	Jun 2021	-		0.100	Continuing	Continuing	-
MMHE - PMA	Various	Various : Eglin AFB, FL	-	0.430	Jun 2019	0.400	Jun 2020	0.400	Jun 2021	-		0.400	Continuing	Continuing	-
BLU-136/B - PMA	Various	Various : NV	-	-		-		-		-		-	Continuing	Continuing	-
CHOBS - PMA	Various	Various : Eglin AFB, FL	-	0.335	Oct 2018	0.206	Oct 2019	0.635	Oct 2020	-		0.635	Continuing	Continuing	-
JAGM-F - PMA	Various	Various : Eglin AFB, FL	-	0.722	Sep 2019	0.753	Aug 2020	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	1.587		1.459		1.135		-		1.135	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		39.742	19.054	18.011	-	18.011	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 653133 / <i>Bombs &amp; Fuzes</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b><i>Bombs and Fuzes</i></b>																												
MMHE: design, prototype, test priority efforts																												
Execute IMSP POAM																												
BLU-136/B: Warhead design/initial prototype																												
C-HOBS: RFP/Source selection																												
C-HOBS: Contract Award																												
C-HOBS: Design, build, test, and integrate																												
Medium Caliber Ammunition: Assess, refine, and develop																												
JAGM-F contract award																												
JAGM-F: Conduct demononstration																												
M-Code Receivers Development																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 653133 / <i>Bombs &amp; Fuzes</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Bombs and Fuzes</i></b>				
MMHE: design, prototype, test priority efforts	1	2019	4	2025
Execute IMSP POAM	1	2019	4	2025
BLU-136/B: Warhead design/initial prototype	1	2019	4	2019
C-HOBS: RFP/Source selection	1	2019	2	2019
C-HOBS: Contract Award	2	2019	2	2019
C-HOBS: Design, build, test, and integrate	2	2019	4	2021
Medium Caliber Ammunition: Assess, refine, and develop	1	2019	4	2025
JAGM-F contract award	3	2019	3	2019
JAGM-F: Conduct demononstration	3	2019	4	2021
M-Code Receivers Development	3	2019	4	2020

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>				<b>Project (Number/Name)</b> 655361 / <i>Stores-Aircraft Interface</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
655361: <i>Stores-Aircraft Interface</i>	-	5.046	8.989	5.065	0.000	5.065	5.173	5.265	5.359	5.458	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

655361: The Stores-Aircraft Interface conducts stores-aircraft interface upgrades and standards development to include the Universal Armament Interface (UAI). UAI is an Air Force initiative to develop standardized software interfaces in aircraft weapons and mission planning. The savings realized from this effort is on average 6 years of schedule and \$22M per aircraft/weapon combination. This is accomplished by enabling integration of weapons independent of aircraft Operational Flight Programs (OFP) cycles. UAI is currently implemented on the F-15E, F-16 Block 40/50 and European Participating Air Forces (EPAF) F-16 aircraft, Small Diameter Bomb (SDB) I and II, Joint Direct Attack Munition (JDAM), Laser JDAM, Joint Air-to-Surface Stand-off Missile (JASSM), and Precision Guided Munitions Planning Software (PGMPS). Planned implementation include Joint Strike Fighter (JSF/F-35), B-21, MQ-9, JASSM-Extended Range (JASSM-ER), F/A-18, Advanced Anti-Radiation Guided Missile - Extended Range (AARGM-ER), Combat Weapons Delivery Software (CWDS), SPEAR3, Joint Strike Missile (JSM), and the Turkish Stand Off Missile - Joint (SOM-J). The UAI program office is responsible for development and enhancement of the standard, support to coalition/allied/joint interoperability efforts for weapons-platform interface, provision of certification tools, and implementation support to aircraft and weapons.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Universal Armament Interface (UAI) Development	5.046	8.989	5.065	-	5.065
<b>Description:</b> Continue development and maintenance of the Air Force's mandated aircraft/weapon interface, to include UAI Mission Planning and Launch Acceptability Region (LAR) components.					
<b>FY 2020 Plans:</b> Evolving requirements force continued development and configuration management of UAI to support the SAF/AQ UAI mandate. All air-to-ground weapon and aircraft systems now require UAI support in multiple forms. Support and facilitate certification efforts, working groups, technical meetings, workshops, risk reduction assessments, common mission planning components, as well as platform- and weapon-specific implementations of UAI. Maintain and logistically support a fleet of UAI certification tools to meet current and future user system integration needs. The tools used among aircraft and weapons programs reduce time/cost of UAI integration efforts and provide a common means to certify a UAI compliant system. Support multinational Memorandum of Understanding system implementation of UAI including the Joint Strike Missile (JSM), SPEAR 3, and Stand Off Missile - Joint (SOM-J).					
<b>FY 2021 Base Plans:</b>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 655361 / <i>Stores-Aircraft Interface</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Continue development and configuration management of UAI in response to evolving requirements to include expanding capability to support air-to-air weapon integration. Ongoing air-to-ground integration support includes all USAF weapons, aircraft including USN and US Army customers. Support working groups, technical meetings and workshops, risk reduction assessments, common mission planning, and platform-specific implementation of UAI. Maintain and logistically support existing certification tools to meet current and future user system integration lab test certification needs. These tools are shared among aircraft and weapons programs to reduce time and cost for UAI integration efforts. Support multinational Memorandum of Understanding including but not limited to Joint Strike Missile (JSM), SPEAR 3, and Stand Off Missile - Joint (SOM-J).					
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Funding decreased due to a return of funding at a historical level of effort.					
<b>Accomplishments/Planned Programs Subtotals</b>	5.046	8.989	5.065	-	5.065

**C. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**  
N/A

**D. Acquisition Strategy**  
In December 2004, under the authority of a class Justification and Approval (J&A), the UAI program office awarded individual Cost Plus Fixed Fee (CPFF) contracts to Boeing, Lockheed Martin, Northrop Grumman, and Raytheon. Each Original Equipment Manufacturer is responsible for a different piece of the total UAI requirement based on its product-specific (platform/weapon) expertise. During FY10, these contracts expired. Under the authority of the class J&A, Cost Plus Incentive Fee (CPIF) contracts were awarded to the four UAI vendors in August 2010. Follow-on period of performance was awarded in March 2014 for 16 months to better align future contract awards with funding through the Future Years Defense Program. The period of performance was extended to 1 November 2015 to allow immediate start of the effort on F-35/JSF request for changes. A new J&A was approved in January 2015 for the follow-on sole source contracts to the original equipment manufacturers. These new sole-source contracts were awarded in November 2015 and expired in November 2019. A new J&A was signed in December 2018 and four new five-year sole source contracts (CPFF) were awarded in November 2019.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 655361 / <i>Stores-Aircraft Interface</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Interface Control Document (ICD) Development/Updates/Maintenance	SS/ Various	Boeing Northrop Grumman Lockheed Martin Raytheon : Various	-	4.846	Nov 2018	8.787	Nov 2019	4.861	Nov 2020	-		4.861	Continuing	Continuing	-
Certification Tool	SS/CPFF	Boeing Northrop Grumman Lockheed Martin Raytheon : Various	-	-		-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	4.846		8.787		4.861		-		4.861	Continuing	Continuing	N/A

**Remarks**  
New 5 year Follow-on contract will be awarded in November 2019.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS Contractor Support	Various	Various : Various	-	0.140		0.142		0.144		-		0.144	Continuing	Continuing	-
Program Office Travel	C/CPAF	Not specified. : TBD	-	0.060		0.060		0.060		-		0.060	Continuing	Continuing	-
<b>Subtotal</b>			-	0.200		0.202		0.204		-		0.204	Continuing	Continuing	N/A

**Remarks**  
PE Systems Contractor provides support to the Program Office for financial services.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	5.046	8.989	5.065	-	5.065	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 655361 / <i>Stores-Aircraft Interface</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Stores-Aircraft Interface</b>																												
Governance (Super Joint Interface Control Working Group)																												
Certification Tools (CTs) Dev / Update																												
UAI (Msn Plng) Common Component																												
WPN Sustainment/Regression Efforts: JDAM, JASSM-ER, SDB I+II																												
A/C Sustainment/Regression Efforts: F-16 Blk 40/50, F-15E																												
WPN Dev: SiAW, JSM, SPEAR3, LRASM, AARGM-ER, JAGM-F, Golden Horde																												
A/C Dev: F-16 Foreign Military Sales, F-35, B-21, B-1, A-10, F-22, F-18, MQ-9, F-15EX, MQ-IC																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604602F / <i>Armament/Ordnance Development</i>	<b>Project (Number/Name)</b> 655361 / <i>Stores-Aircraft Interface</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Stores-Aircraft Interface</b>				
Governance (Super Joint Interface Control Working Group)	1	2019	4	2025
Certification Tools (CTs) Dev / Update	1	2019	4	2025
UAI (Msn Plng) Common Component	1	2019	4	2025
WPN Sustainment/Regression Efforts: JDAM, JASSM-ER, SDB I+II	1	2019	4	2025
A/C Sustainment/Regression Efforts: F-16 Blk 40/50, F-15E	1	2019	4	2025
WPN Dev: SiAW, JSM, SPEAR3, LRASM, AARGM-ER, JAGM-F, Golden Horde	1	2019	4	2025
A/C Dev: F-16 Foreign Military Sales, F-35, B-21, B-1, A-10, F-22, F-18, MQ-9, F-15EX, MQ-IC	1	2019	4	2025



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604604F / <i>Submunitions</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	2.989	3.045	3.091	0.000	3.091	3.155	3.211	3.267	3.327	Continuing	Continuing
653166: <i>Joint Smart Munitions Test and Evaluation</i>	-	2.989	3.045	3.091	0.000	3.091	3.155	3.211	3.267	3.327	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Project Chicken Little (PCL) continues providing superior rapid reaction signature exploitation capabilities for use on both the traditional and the asymmetrical battlefield. PCL delivers vital one-of-a-kind research, development, test, and evaluation (RDT&E) expertise directly to the warfighter, capability developer, and allied/coalition forces.

From its inception in 1985, PCL constantly advances the state-of-the-art for developmental smart munitions, seekers/sensors, and their platforms. PCL also focuses its capability against today's networked weapons, emerging weapon concepts, and helps develop innovative targeting technologies to be employed against a wide variety of vehicle targets, theater air defense units, and an extensive array of associated equipment.

Combat systems and support equipment exhibit physical characteristics (i.e. signatures) and present certain vulnerabilities, which can be exploited by various targeting technologies leading to the elimination or incapacitation of the threat through the application of force (e.g. smart munitions or directed energy) or application of intelligence, surveillance, reconnaissance (ISR) methods. PCL collects physical, functional, and signature attributes of real foreign threat systems and related equipment; these data feed high-fidelity models used to predict detection, classification, vulnerability, and effectiveness performance for ISR sensor and weapon system design. PCL collects high resolution signature data using a variety of ground, air, and space-based sensors against both new and existing (obtained, sustained, and maintained to be signature representative) foreign targets; with and without the presence of camouflage, concealment, and deception materials; and operated using enemy tactics/Concept of Operations (CONOPS). The resulting highly reliable, realistic data directly support munitions/targeting development programs and helps mitigate overall acquisition risk. PCL serves as a major focal point for joint signature exploitation, collection, and dissemination within the DoD. PCL is a prime contributor in the time critical process to rapidly exploit, assess, and determine US and allied weapon/targeting performance against high value targets. Customers include: the major Defense and Service Intelligence Centers, all Services, the Joint Technical Coordinating Group (JTCCG) who develop the Joint Munitions Effectiveness Manuals (JMEm), Combatant Commands, AF Major Commands, US Air Force Weapons School curriculum support, and others. Current projects include, but are not limited to: target signature exploitation, target geometric modeling (for identifying vulnerabilities), improving air capabilities against protected structures (specifically hard and deeply buried targets), and the testing of multiple seekers, sensors, and targeting technologies in representative environments against Combatant Command/Major Command/Intelligence Community high value targets.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Chicken Little capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604604F / <i>Submunitions</i>
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This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	2.990	3.045	3.096	0.000	3.096
Current President's Budget	2.989	3.045	3.091	0.000	3.091
Total Adjustments	-0.001	0.000	-0.005	0.000	-0.005
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.001	0.000	-0.005	0.000	-0.005

**Change Summary Explanation**

N/A

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Project Chicken Little	2.989	3.045	3.091
<b>Description:</b> Provide the DoD community accurate multi-spectral signatures obtained from high-value, signature representative modern threat systems using advanced collection technologies.			
Exploitations typically occur CONUS; however, Project Chicken Little is postured to support OCONUS collections as dictated by mission requirements.			
A critical underpinning of the System Exploitation major thrust area, Sensor Week, occurs every two years and provides a unique air and ground demonstration/validation of candidate Seeker/Sensor/ISR technologies.			
Plan and conduct captive carry flight tests and signature collection for seeker/sensor technology evaluations.			
Develop, validate, and accredit improved models for target vulnerability and weapons effectiveness in support of Combatant Commands' (COCOMs) requirements.			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604604F / <i>Submunitions</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b><i>FY 2020 Plans:</i></b> Exploit high value threat systems (typically 4 per year). Provide signature data from multiple threat systems in various environments using advanced and developmental seeker/sensor technologies.</p> <p>Conduct Sensor Week (SW), providing a singularly unique forum for joint service demonstration of developmental and operational seekers/sensors/ISR assets against a wide array of US, coalition, and foreign national ground targets.</p> <p>Exploit the signatures of ISR targets, conduct rapid reaction performance analysis &amp; evaluations in support of Combatant Command/Major Command immediate/urgent warfighter needs, and optimize current project methods to support ISR testing.</p> <p>No OCONUS requirements.</p> <p>Assist in obtaining relevant, high value, and emergent threat assets and/or decoys. Ensure the fleet foreign threat assets remain properly "signature representative" for systems development and testing.</p> <p>Develop, validate, and accredit improved computer models to determine target vulnerability and weapons effectiveness in support of warfighter requirements.</p> <p><b><i>FY 2021 Plans:</i></b> Exploit high value threat systems (typically 4 per year). Provide signature data from multiple threat systems in various environments using advanced and developmental seeker/sensor technologies.</p> <p>Conduct Sensor Week (SW), providing a singularly unique forum for joint service demonstration of developmental and operational seekers/sensors/ISR assets against a wide array of US, coalition, and foreign national ground targets.</p> <p>Exploit the signatures of ISR targets; conduct rapid reaction performance analysis &amp; evaluations in support of COCOM/MAJCOM immediate/urgent warfighter needs; optimize current project methods to support ISR testing; capture and catalog multi-spectral signatures on asymmetric threat Unmanned Aerial Systems (UAS).</p> <p>Assist in obtaining relevant, high value, and emergent threat assets and/or decoys. Ensure the</p>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604604F / <i>Submunitions</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
fleet foreign threat assets remain properly "signature representative" for systems development and testing.			
Develop, validate, and accredit improved computer vulnerability and weapons effectiveness in support of warfighter requirements.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Funding increased due to inflation fluctuation.			
<b>Accomplishments/Planned Programs Subtotals</b>	2.989	3.045	3.091

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

Funds are executed organically in support of test and evaluation activities including studies, analyses, flight & ground tests, model building and simulation. Virtually all of the work is performed in-house by the 96th Test Wing.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604604F / <i>Submunitions</i>	<b>Project (Number/Name)</b> 653166 / <i>Joint Smart Munitions Test and Evaluation</i>
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Maintain Test Asset Relevancy	PO	Various : Las Vegas, NV	-	0.800	Nov 2018	0.800	Nov 2019	0.800	Nov 2020	-		0.800	Continuing	Continuing	0.800
<b>Subtotal</b>			-	0.800		0.800		0.800		-		0.800	Continuing	Continuing	N/A

**Remarks**  
Fleet relevance addresses the acquisition of new and emerging threat vehicles, acquisition of high fidelity decoys, and sustainment of fleet signature quality.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Conduct Test and Analysis	MIPR	96th Test Wing : Eglin AFB, FL	-	2.134	Nov 2018	2.190	Nov 2019	2.236	Nov 2020	-		2.236	Continuing	Continuing	-
<b>Subtotal</b>			-	2.134		2.190		2.236		-		2.236	Continuing	Continuing	N/A

**Remarks**  
96th Test Wing (96 CTG, 46 TS) is the Program Office which conducts inhouse testing.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	MIPR	46TS/TGBB : Eglin, FL	-	0.055	Nov 2018	0.055	Nov 2019	0.055	Nov 2020	-		0.055	Continuing	Continuing	-
<b>Subtotal</b>			-	0.055		0.055		0.055		-		0.055	Continuing	Continuing	N/A

**Remarks**  
96th Test Wing (96 CTG, 46 TS) is the Program Office which conducts in house testing.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	2.989	3.045	3.091	-	3.091	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Air Force							<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 3600 / 5			<b>R-1 Program Element (Number/Name)</b> PE 0604604F / <i>Submunitions</i>			<b>Project (Number/Name)</b> 653166 / <i>Joint Smart Munitions Test and Evaluation</i>				
	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	

Remarks



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604604F / <i>Submunitions</i>	<b>Project (Number/Name)</b> 653166 / <i>Joint Smart Munitions Test and Evaluation</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Project Chicken Little; JMT&amp;E</i></b>				
Target/warhead evaluation/analysis, signature test, captive carry flight tests.	1	2019	4	2025
FY18 Sensor Week	1	2019	3	2019
FY20 Sensor Week	3	2020	3	2021
FY22 Sensor Week	3	2022	3	2023
FY24 Sensor Week	3	2024	3	2025



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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / <i>Agile Combat Support</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	22.739	26.944	20.609	0.000	20.609	18.006	18.327	23.172	23.601	Continuing	Continuing
652895: <i>Civil Engineering Readiness</i>	-	21.197	18.315	18.955	0.000	18.955	16.316	16.607	21.214	21.606	Continuing	Continuing
654910: <i>Aeromedical Readiness</i>	-	1.542	8.629	1.654	0.000	1.654	1.690	1.720	1.958	1.995	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

This program provides lighter, leaner, rapidly-deployable and technologically-advanced materiel, forces and capabilities to the warfighter. Current projects in this program include Civil Engineering Readiness (Project 652895) and Aeromedical Readiness (Project 654910). Civil Engineering Readiness projects enable airfield protection, and airfield damage recovery for sustainment, and increased resiliency of airfield operations anywhere in the world. Aeromedical Readiness projects provide aerospace medical systems and treatment equipment to improve casualty care and meet worldwide warfighter medical operational requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the Civil Engineering and Aeromedical Readiness capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	23.489	19.944	20.646	0.000	20.646
Current President's Budget	22.739	26.944	20.609	0.000	20.609
Total Adjustments	-0.750	7.000	-0.037	0.000	-0.037
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	7.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.750	0.000			
• Other Adjustments	0.000	0.000	-0.037	0.000	-0.037

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 652895: *Civil Engineering Readiness*

FY 2019	FY 2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / <i>Agile Combat Support</i>
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

Congressional Add: *Explosive Resistant Windows Technology*

Congressional Add Subtotals for Project: 652895

**Project: 654910: *Aeromedical Readiness***

Congressional Add: *Multi-Modal Threat Detection and Mitigation*

Congressional Add Subtotals for Project: 654910

Congressional Add Totals for all Projects

	FY 2019	FY 2020
	3.374	0.000
	3.374	0.000
	0.000	7.000
	0.000	7.000
	3.374	7.000

**Change Summary Explanation**

FY20 Congressional Add for Multi-modal threat detection and mitigation

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / Agile Combat Support	<b>Project (Number/Name)</b> 652895 / Civil Engineering Readiness
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
652895: <i>Civil Engineering Readiness</i>	-	21.197	18.315	18.955	0.000	18.955	16.316	16.607	21.214	21.606	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Civil Engineering (CE) Readiness project develops Airbase Technologies (ABT), Airfield Damage Repair (ADR), Airfield Protection (AP), Energy & Utilities (E&U), and CE Materials (CEM) solutions for in-garrison, expeditionary, and contingency installations and airbases. This includes: technologies for airfield assessment, pavement repair and unexploded ordnance identification and mitigation to enable rapid recovery and regeneration of airfield operations; infrastructure design criteria, construction methods, hardened shelters, evaluation tools, materials, aviation firefighting, force protection, expeditionary energy, waste water recycling/treatment, CE materials applications and systems for improved resiliency and rapid recovery of airbase and airfield operations following an attack.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> Airbase Technologies	1.567	1.698	3.044
<b>Description:</b> Technical support providing RDT&E capabilities for cross-cutting CE applications and processes for all CE functional areas. Provides replacements and repair of critical RDT&E lab equipment, test systems and instruments. Specialized RDT&E systems and software required to conduct CE RDT&E.			
<b>FY 2020 Plans:</b> Continue development and testing material technologies for indigenous soil-based cements and bio-cementation for expeditionary ADR, test and evaluation of aviation asphalt aging mitigation technologies for reduced life cycle costs, development and testing of additive manufacturing approaches for CE applications, development of functionalized materials for hardened infrastructure and force protection applications, evaluation of disposal and mitigation technologies for AFFF and evaluation of expeditionary energy storage systems for incorporation of renewable energy systems with USAF BEAR equipment. Replace/repair critical RDT&E lab equipment. Fund program management support, RDT&E IT systems and software required to conduct CE RDT&E.			
<b>FY 2021 Plans:</b> Continue development and testing material technologies for indigenous soil-based cements and bio-cementation for expeditionary ADR, test and evaluation of aviation asphalt aging mitigation technologies for reduced life cycle costs, development and testing of additive manufacturing approaches for CE applications, development of functionalized materials for hardened infrastructure and force protection applications, evaluation of disposal and mitigation technologies for AFFF and evaluation of expeditionary energy storage systems for incorporation of renewable energy systems with USAF BEAR equipment. Replace/repair critical RDT&E lab equipment. Fund program management support, RDT&E IT systems and software required to conduct CE RDT&E.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / Agile Combat Support	<b>Project (Number/Name)</b> 652895 / Civil Engineering Readiness		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Planned increase based on project requirements				
<b>Title:</b> Airfield Damage Repair		10.333	10.666	10.308
<p><b>Description:</b> This effort develops, tests, and certifies equipment, materials, and Tactics, Techniques, and Procedures (TTPs) for the rapid assessment and repair of airfield damage, which includes identification, mitigation or removal of unexploded ordnance and expedient repairs for fuel and utility systems. This effort will also accelerate the transition of proven technologies in expedient and sustained protection of critical infrastructure, including operating surfaces, shelters, fuel storage and distribution systems, and command and control (C2) systems. Further, this effort focuses on the resiliency of airbase infrastructure as well as the timely repair and regeneration of airfield operations within established time limits in order to gain and maintain air superiority.</p> <p><b>FY 2020 Plans:</b> Mature and transition the rapid assessment, mitigation and repair tools and solutions for airfield damage repair through research, development, testing and evaluation. Rapid assessment includes the development of spiral 3 SUAS, sensors, and automated damaging detection solutions to significantly decrease the assessment time and improve automated detection of unexploded ordnance. Mitigation includes the testing and evaluation of generation 2 systems to remotely neutralize and remove UXOs through a family of Rapid Explosive Hazard Mitigation (REHM) systems. Repair of airfield damage focuses on development, testing and transition of lighter/leaner systems and materials including maximum use of native in-situ materials for airfield recovery.</p> <p><b>FY 2021 Plans:</b> Mature and transition the rapid assessment, mitigation, and repair tool and material solutions for airfield damage recovery through research, development, testing, and evaluation. Rapid assessment includes spiral development of integration of small unmanned aerial systems (SUAS), sensors, and automated damage detection software solutions to significantly decrease damage assessment time and improve automated detection of unexploded ordnance (UXO). Mitigation includes testing and evaluation of automated systems to remotely remove and neutralize UXO through a family of Rapid Explosive Hazard Mitigation (REHM) components. This family of systems will include manned and unmanned systems with improved blast resistance capability to fit on both new and existing systems. Repair of damage focuses on development, testing, and transition of materials and equipment sets for rapid recovery of enemy induced battle damaged runways. New materials will have minimal dependence on shipping and logistics, with importance being placed on materials available on hand at any location, while new systems will focus heavily on testing and operation in extreme weather conditions.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Planned decrease based on project requirements</p>				
<b>Title:</b> Expeditionary Airfield Damage Repair (EADR) JCTD		3.143	2.751	2.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / Agile Combat Support	<b>Project (Number/Name)</b> 652895 / Civil Engineering Readiness
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> The purpose of the EADR JCTD is to develop and transition the capability to rapidly and repeatedly repair damaged airfield surfaces operating under the dynamic basing concept of operations (CONOP). The goal is to develop and transition technologies that minimize airfield downtime and maximize combat sortie generation. The JCTD will execute a spiral development-oriented program that will transition mature technologies throughout the life of the program.</p> <p><b>FY 2020 Plans:</b> Continue to execute and revise a series of structured analysis of alternatives (AoA) to identify and down-select capability solutions to meet operational requirements. Execute a spiral development program to include modeling, JCTD-appropriate advanced technology development, test and evaluation and field-worthy assessment of prototype solutions. Develop and assess the component spiral products comprising the total capability; along with a predictive methodology to estimate site-specific repair requirements and the tactics, techniques and procedures (TTP) necessary for capability operation. Begin transitioning and acquisition of solutions to meet the requirements for expedient and expeditionary airfield damage repair (EADR).</p> <p><b>FY 2021 Plans:</b> Down-select final capability solution set to meet operational requirement. Conduct final Operational User Assessment exercises to demonstrate final total capability for prototype solution. Publish predictive methodology to estimate site-specific repair requirements and tactics, techniques, and procedures (TTP) necessary for capability operation across services. Begin transition and acquisition of solutions to meet requirements for expedient and expeditionary airfield damage repair (EADR).</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Planned decrease - final year of JCTD</p>			
<p><b>Title:</b> Airfield Protection</p> <p><b>Description:</b> Research, develop and transition technologies for hardening and protecting airfield infrastructure from munitions attack, unexploded ordnance and aircraft, equipment and infrastructure fires. Included within this effort are structural solutions, expeditionary and expedient hardening and protection solutions, explosive ordnance disposal technologies and aviation firefighting technologies. The technologies developed from this effort provide improved resiliency and rapid restoration of airbase and airfield operations following an attack.</p> <p><b>FY 2020 Plans:</b> Continue RDT&amp;E of new concepts for protection materials for lighter, less expensive solutions for infrastructure hardening. Test and evaluate technologies against penetrating munitions including cruise missile hardening and improve expedient sheltering to address advanced threats. Continue development and begin testing of selective hardening systems for infrastructure. Continue testing and evaluation of unconventional countermeasures technology for transition. Continue research and development of aviation firefighting technologies for treatment and replacement of the perfluorinated aqueous film forming foams (AFFF),</p>	2.780	2.800	2.603

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / Agile Combat Support	<b>Project (Number/Name)</b> 652895 / Civil Engineering Readiness

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>clean firefighting agents - Halon replacement and aviation firefighting equipment. Continue RDT&amp;E of EOD technologies for neutralization of sub-munition and UXO threats.</p> <p><b>FY 2021 Plans:</b> Continue RDT&amp;E of new concepts for protection materials for lighter, less expensive solutions for infrastructure hardening. Test and evaluate technologies against penetrating munitions including cruise missile hardening and improve expedient sheltering to address advanced threats. Continue development and begin testing of selective hardening systems for infrastructure. Continue testing and evaluation of unconventional countermeasures technology for transition. Continue research and development of aviation firefighting technologies for treatment and replacement of the perfluorinated aqueous film forming foams (AFFF), clean firefighting agents - Halon replacement and aviation firefighting equipment. Continue RDT&amp;E of EOD technologies for neutralization of sub-munition and UXO threats.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Planned decrease based on project requirements</p>			
<p><b>Title:</b> Energy &amp; Utilities</p> <p><b>Description:</b> Research, develop and transition technologies for energy and utilities resiliency for BEAR base and airbase infrastructure. The focus of this effort is for energy and utilities technologies that provide increased efficiency and decreased logistic costs for expeditionary and in-garrison applications. This includes:expeditionary shelters, environmental conditioning systems, water and waste stream processing, power production and power management systems.</p> <p><b>FY 2020 Plans:</b> Continue development of the BTEIL and METER sites at Tyndall AFB. Test and evaluate new energy &amp; water expeditionary technologies and systems in an operational environment prior to fielding. Conduct bench and lab scale testing of new energy and utilities technologies at the METER site prior to scaling up to full scale test and evaluation at the BTEIL site. Support test and evaluation of commercial technologies/systems to improve efficiency and reduce waste for expeditionary and fixed base operations. This includes:expeditionary shelters, environmental conditioning systems, water and waste stream processing, power production and power management systems.</p> <p><b>FY 2021 Plans:</b> Continue development of the METER site at Tyndall AFB. . Conduct bench and lab scale testing of new energy and utilities technologies at the METER site prior to scaling up to full scale test and evaluation at the BTEIL site. Test and evaluate expeditionary energy and shelter technologies that incorporate resiliency and sustainability for USAF expeditionary assets. Field demonstration of innovative expeditionary water and waste systems in an operational environment prior to fielding. Support test and evaluation of commercial technologies/systems that includes: expeditionary shelters, environmental conditioning systems, energy storage, power generation and management system, water and waste stream processing system. These system will</p>	0.000	0.400	1.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / Agile Combat Support	<b>Project (Number/Name)</b> 652895 / Civil Engineering Readiness

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
provide war-fighter with improve energy resiliency and efficiency while and reducing logistics for expeditionary and fixed base operations.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No changes - continuing			
<b>Accomplishments/Planned Programs Subtotals</b>	17.823	18.315	18.955

	<b>FY 2019</b>	<b>FY 2020</b>
<b>Congressional Add:</b> Explosive Resistant Windows Technology	3.374	0.000
<b>FY 2019 Accomplishments:</b> Contract award delayed - contract awarded June 2019 - no significant accomplishment in FY19		
<b>FY 2020 Plans:</b> Develop and assess blast and ballistic resistant window, entry and surrounding structure for improved performance against open blast and cased munitions		
<b>Congressional Adds Subtotals</b>	3.374	0.000

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 04 Line Item 845100A: Contingency Operations - Engineering and EOD Equipment	77.209	14.752	0.000	-	0.000	69.327	163.362	167.150	161.639	Continuing	Continuing

**Remarks**  
FY19-25 Procurement funding for Expedient Small Asset Protection (ESAP) systems, Rapid Airfield Damage Assessment System (RADAS) and Recovery of Airbases Denied by Ordnance (RADBO)in PE 0208028F.

**D. Acquisition Strategy**

This Civil Engineering (CE) Readiness project develops and evaluates technologies for in-garrison, expeditionary, and contingency installations & airbases. This encompasses a wide range of solutions and COTS equipment that are fielded to support the CE mission of the USAF. The acquisition strategy utilizes AFCEC RDT&E contracts as well as other DoD and US Government laboratories/engineering centers, contracts and other transaction agreements whenever practical for the specific technology development effort.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / Agile Combat Support	<b>Project (Number/Name)</b> 652895 / Civil Engineering Readiness
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Airbase Technologies	Various	AFCEC : Tyndall AFB, FL	-	1.567	Nov 2017	1.698	Oct 2019	1.419		-		1.419	Continuing	Continuing	-
Airfield Damage Repair (ADR)	Various	AFCEC : Tyndall AFB, FL	-	2.400	Dec 2018	2.400	Dec 2019	1.272	Dec 2020	-		1.272	Continuing	Continuing	-
Airfield Damage Repair (ADR) ERDC	MIPR	USERDC : Vicksburg, MS	-	2.500	Jan 2019	2.000	Jan 2020	2.100	Jan 2021	-		2.100	Continuing	Continuing	-
Airfield Damage Repair (ADR) Asphalt	C/CPFF	Applied Research Associates : Tyndall AFB, FL	-	1.500	Apr 2019	0.700	Dec 2020	-		-		-	Continuing	Continuing	-
Airfield Pavements & Technologies	C/CPFF	TBD : TBD	-	-		1.000	Apr 2020	2.500	Oct 2020	-		2.500	Continuing	Continuing	-
Expeditionary Airfield Damage Repair (EADR) JCTD	Various	Not specified. : TBD	-	2.780	Apr 2019	2.751	Jan 2020	2.000	Oct 2020	-		2.000	0.000	7.531	-
Rapid Explosive Hazard Mitigation (REHM) Robotics	C/CPFF	Applied Research Associates : Tyndall AFB, FL	-	1.250	Dec 2018	0.400		-		-		-	Continuing	Continuing	-
EOD & Robotics Technologies	C/CPFF	TBD : TBD	-	-		0.727	Apr 2020	2.000	Oct 2020	-		2.000	Continuing	Continuing	-
Rapid Airfield Damage Assessment System (RADAS) Integration	MIPR	TORC Robotics : Blacksburg, VA	-	2.091	Dec 2018	2.100	Dec 2020	2.000	Dec 2020	-		2.000	Continuing	Continuing	-
Airfield Protection	Various	AFCEC : Tyndall AFB, FL	-	1.850	Sep 2018	-		-		-		-	Continuing	Continuing	-
Airfield Protection (AP) Infrastructure Hardening	C/CPFF	Battelle : Panama City, FL	-	3.070	Jun 2019	1.900	Oct 2019	2.075	Dec 2020	-		2.075	Continuing	Continuing	-
Airfield Protection (AP) Aviation Firefighting Technologies	C/CPFF	Battelle : Panama City, FL	-	0.900	Nov 2017	0.900	Oct 2019	1.300	Dec 2020	-		1.300	Continuing	Continuing	-
Energy & Utilities RDT&E	C/CPFF	Battelle : Panama City, FL	-	-		0.450	Jan 2020	1.000	Oct 2020	-		1.000	Continuing	Continuing	-
<b>Subtotal</b>			-	19.908		17.026		17.666		-		17.666	Continuing	Continuing	N/A



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / Agile Combat Support	<b>Project (Number/Name)</b> 652895 / Civil Engineering Readiness
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

**Remarks**  
\$77K increase to FY18 ADR due to inflation adjustment

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Program Management Administration (PMA)	Various	AFCEC : Tyndall AFB, FL	-	0.325	Nov 2018	0.325	Apr 2019	0.325	Apr 2021	-		0.325	Continuing	Continuing	-
<b>Subtotal</b>			-	0.325		0.325		0.325		-		0.325	Continuing	Continuing	N/A

**Remarks**  
PMA includes travel and supplies to support CE Readiness RDT&E activities.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
A&AS Program Support RDT&E	C/FFP	Multiple : FL	-	0.964	Jan 2019	0.964	Jan 2020	0.964	Oct 2020	-		0.964	Continuing	Continuing	-
<b>Subtotal</b>			-	0.964		0.964		0.964		-		0.964	Continuing	Continuing	N/A

**Remarks**  
Advisory and Assistance Services (A&AS) contract support for the Life Cycle Management Center (LCMC) procurement of Expeditionary Small Airfield Protection (ESAP), Expeditionary Large Airfield Protection (ELAP), and WaFERS.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		-	21.197	18.315	18.955	18.955	Continuing	Continuing	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / Agile Combat Support	<b>Project (Number/Name)</b> 652895 / Civil Engineering Readiness
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>CE Readiness</b>																												
Airbase Technologies																												
ADR Robotic In-seat Appliques																												
ADR In-situ Material Repair RDT&E																												
ADR Lighter/Leaner Expeditionary Repair																												
E-ADR JCTD																												
REHM Spiral 2 Rapid UXO Clearance																												
RADAS Development, Test & Evaluation																												
RADAS Spiral 2 RDT&E																												
Airfield Mitigation and Recovery Robotics																												
AFFF disposal and mitigation technologies																												
Directed Energy Application for UXO Neutralization																												
Civil engineering projects for sustained airbase operations																												
Airfield Protection - Advanced Hardening RDT&E																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / Agile Combat Support	<b>Project (Number/Name)</b> 652895 / Civil Engineering Readiness
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>CE Readiness</b>				
Airbase Technologies	1	2019	4	2024
ADR Robotic In-seat Appliques	1	2019	2	2021
ADR In-situ Material Repair RDT&E	1	2019	4	2023
ADR Lighter/Leaner Expeditionary Repair	1	2019	4	2022
E-ADR JCTD	1	2019	4	2021
REHM Spiral 2 Rapid UXO Clearance	1	2019	4	2023
RADAS Development, Test & Evaluation	1	2019	4	2023
RADAS Spiral 2 RDT&E	1	2019	4	2021
Airfield Mitigation and Recovery Robotics	1	2019	3	2024
AFFF disposal and mitigation technologies	1	2019	4	2024
Directed Energy Application for UXO Neutralization	2	2019	4	2022
Civil engineering projects for sustained airbase operations	1	2019	1	2024
Airfield Protection - Advanced Hardening RDT&E	1	2019	4	2023

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604617F / Agile Combat Support				<b>Project (Number/Name)</b> 654910 / Aeromedical Readiness			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
654910: Aeromedical Readiness	-	1.542	8.629	1.654	0.000	1.654	1.690	1.720	1.958	1.995	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This program provides key capabilities that provide life-saving and/or quality of life technologies and equipment. Aeromedical Readiness program enables the critical care of combat casualties by further developing and optimizing existing technologies for ground Expeditionary Medical Systems (EMEDS) and Aeromedical evacuation systems. EMEDS and Aeromedical Evacuation systems provide the urgent care needed to treat deployed injured warfighters and return them to duty while in country, and to treat combat casualties that need to be safely transported to a stateside hospital for follow on treatment. The program also supports critical capabilities development in the multi-disciplinary areas for light-weight, durable, and rapidly deployable medical equipment to ensure the Air Force is poised to meet future medical readiness and operational requirements. Additionally, the program supports research efforts to optimize human physiologic and cognitive performance.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Non-Invasive Warming and Cooling Device (NIWCD)</p> <p><b>Description:</b> Single device to provide therapeutic temperature control during treatment and movement of patient from point of injury through the continuum of care. The mortality in combat casualties with hypothermia is double that of normothermic casualties with similar injuries.</p> <p><b>FY 2020 Plans:</b> Contract close-out</p> <p><b>FY 2021 Plans:</b> Contract Closed out in FY20</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Contract Closed out in FY20</p>	0.625	0.000	0.000
<p><b>Title:</b> Aeromedical Equipment Testing/Studies/Minor Development</p> <p><b>Description:</b> Aeromedical supports Defense Health Program, Joint Services and MAJCOM medical modernization. The Air Force Medical Readiness Agency (AFMRA) Surgeon General Requirement Oversight Council (SGROC) Governance process manages medical capability gaps, research and development, funding prioritization and decisional boards. Aeromedical procures and qualifies commercial-off-the-shelf (COTS) or near COTS medical and aeromedical products and/or performs minor development, studies and management efforts, under Aeromedical Readiness. Aeromedical Program efforts evaluate integrating technologies or prototype systems in a realistic operating environment, expedite technology transition from the laboratory to operational use, emphasis on proving maturity prior to integration and viable decision ready materiel solutions.</p>	0.917	1.629	1.654

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / <i>Agile Combat Support</i>	<b>Project (Number/Name)</b> 654910 / <i>Aeromedical Readiness</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
<b><i>FY 2020 Plans:</i></b> Continue EMD and development of high priority warfighter requirements.			
<b><i>FY 2021 Plans:</i></b> Continue the transition of Scientific and Technical (S&T) projects to Research and Development (R&D) of various items in Engineering and Manufacturing Development (EMD) phase of the acquisition life cycle.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Increase to account for inflationary effects.			
<b>Accomplishments/Planned Programs Subtotals</b>	1.542	1.629	1.654

	FY 2019	FY 2020
<b><i>Congressional Add:</i></b> Multi-Modal Threat Detection and Mitigation	0.000	7.000
<b><i>FY 2019 Accomplishments:</i></b> N/A FY20 New Start		
<b><i>FY 2020 Plans:</i></b> Create a force multiplier for USAF wide-area Force Protection by coupling fielded sensor technologies and countermeasures with Artificial Intelligence (AI)/Machine Learning (ML). Enhance the effectiveness of USAF defense personnel with AI/ML systems to detect and classify targets, determine intent, and deploy countermeasures		
<b>Congressional Adds Subtotals</b>	0.000	7.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

Multi-Modal Threat Detection and Mitigation Congressional Add improperly aligned to BPAC 654910. Funding is being executed out of BPAC 652895.

**D. Acquisition Strategy**

Programs will consider a streamlined acquisition approach. Whenever practical, commercial items are tested and evaluated as candidates for providing solutions to user needs. This normally involves contractor characterization, verification, and qualification testing to ensure Food and Drug Administration (FDA) approved, commercial off-the-shelf equipment is properly evaluated to identify any capability gaps that may require minor modifications for military use. However, acquisition strategies may also be carried out for traditional Engineering and Manufacturing Development (EMD). Funds may be used to address associated emerging Aeromedical Readiness requirements and for program management activities.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / Agile Combat Support	<b>Project (Number/Name)</b> 654910 / Aeromedical Readiness
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Non-Invasive Warming and Cooling Aeromedical Equipment	C/CPFF	Edaptive Computing : Dayton, OH	-	0.634	Mar 2019	-		-		-		-	Continuing	Continuing	-
Technology Transfer Planning for Aeromedical Equipment R&D Efforts, Cost Estimates Technology Readiness Assessments, Food and Drug Administration consulting	TBD	TBD : TBD	-	0.907	Sep 2020	1.624	Sep 2021	1.594	Sep 2022	-		1.594	Continuing	Continuing	-
Multi-Modal Threat Detection and Mitigation	C/CPAF	TBD : TBD	-	-		7.000	Mar 2020	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	1.541		8.624		1.594		-		1.594	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Program Management Administration	C/CPFF	AFLCMC : Wright-Patterson AFB, OH	-	0.001	Oct 2018	0.005	Oct 2019	0.060	Oct 2020	-		0.060	Continuing	Continuing	-
<b>Subtotal</b>			-	0.001		0.005		0.060		-		0.060	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	1.542	8.629	1.654	-	1.654	Continuing	Continuing	N/A

**Remarks**

Product Development: Technology Transfer/Aeromedical Equipment is TBD due to contract source selections.

Multi-Modal Threat Detection and Mitigation Congressional Add improperly aligned to BPAC 654910. Funding is being executed out of BPAC 652895.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / <i>Agile Combat Support</i>	<b>Project (Number/Name)</b> 654910 / <i>Aeromedical Readiness</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Aeromedical Readiness RDTE Efforts</i></b>	
EMD Phase for the Non-Invasive Warming & Cooling Device (NIWCD)	
Contract Close Out	
Aeromedical Equipment Testing/Studies/ Minor Development	
<b><i>Multi-Modal Threat Detection and Mitigation</i></b>	
Multi-Modal Threat Detection and Mitigation	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604617F / <i>Agile Combat Support</i>	<b>Project (Number/Name)</b> 654910 / <i>Aeromedical Readiness</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Aeromedical Readiness RDTE Efforts</i></b>				
EMD Phase for the Non-Invasive Warming & Cooling Device (NIWCD)	1	2019	4	2019
Contract Close Out	4	2019	1	2020
Aeromedical Equipment Testing/Studies/Minor Development	1	2020	4	2025
<b><i>Multi-Modal Threat Detection and Mitigation</i></b>				
Multi-Modal Threat Detection and Mitigation	3	2020	4	2022

**Note**

Multi-Modal Threat Detection and Mitigation Congressional Add improperly aligned to BPAC 654910. Funding is being executed out of BPAC 652895.



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604618F <i>I Joint Direct Attack Munition</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	0.000	7.926	0.000	7.926	0.000	0.000	0.000	0.000	0.000	7.926
653891: <i>JDAM M-Code Integration</i>	0.000	0.000	0.000	7.926	0.000	7.926	0.000	0.000	0.000	0.000	0.000	7.926
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 5, PE 0604618F, project 653891, M-Code/Enhanced Anti-Jam (EAJ), is a new start.

**A. Mission Description and Budget Item Justification**

Military Code (M-Code) receivers with Enhanced Anti-Jam (EAJ) will be developed and integrated in order to provide advanced Positioning, Navigation, and Timing (PNT) capabilities to allow operations in anti-access/area denial (A2/AD) environments. M-Code and EAJ also provide increased accuracy, better signal acquisition, and advanced security.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver M-Code/EAJ capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	7.926	0.000	7.926
Total Adjustments	0.000	0.000	7.926	0.000	7.926
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	7.926	0.000	7.926

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604618F <i>I Joint Direct Attack Munition</i>
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**Change Summary Explanation**

FY2021 new start for development and integration of Military Code (M-Code) receivers with Enhanced Anti-Jam (EAJ).

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> M-Code/Enhanced Anti-Jam (EAJ)	0.000	0.000	7.926
<b>Description:</b> Develop and integrate M-Code receivers with EAJ to provide advanced Positioning, Navigation, and Timing (PNT) capabilities, providing the capability to operate in adversarial anti-access/area denial (A2/AD) environments. M-Code receivers with EAJ also provides increased accuracy, better signal acquisition, and advanced security.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> FY21 funding will support qualification testing for M-Code/EAJ.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> This effort is a new start in FY21.			
<b>Accomplishments/Planned Programs Subtotals</b>			
	0.000	0.000	7.926

**D. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• RDTE 04 PE 0604201F: <i>Integrated Avionics Planning and Development</i>	86.445	124.600	-	-	-	-	-	-	-	0.000	211.045

**Remarks**

**E. Acquisition Strategy**

M-Code/EAJ effort uses a Family of Systems approach where the three prime weapons contractors develop receivers capable of operating in any of their AF weapons. The receivers are based on a common, internally-developed Interface Requirements Specification, Technical Requirements Document, and threat scenario. This approach uses a combination of contract types based on acquisition phase (Technology Maturation and Risk Reduction, Development, Production) and risk. The Weapons System Program Offices share a common development program element to allow flexibility in funding and planning, switching to individual PEs for receiver integration, operational testing, and production. The M-Code/EAJ Weapons Receiver Development effort leverages technology currently under development by the Global Positioning System (GPS)-D Military GPS User Equipment (MGUE) program and will provide the warfighter with unmatched capability to operate in future A2/AD environments.



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604618F / <i>Joint Direct Attack Munition</i>	<b>Project (Number/Name)</b> 653891 / <i>JDAM M-Code Integration</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>M-Code/EAJ Receivers</b>	
M-Code/EAJ Test and Evaluation	[REDACTED]

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604618F / <i>Joint Direct Attack Munition</i>	<b>Project (Number/Name)</b> 653891 / <i>JDAM M-Code Integration</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>M-Code/EAJ Receivers</i></b>				
M-Code/EAJ Test and Evaluation	4	2021	3	2022

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)	<b>R-1 Program Element (Number/Name)</b> PE 0604706F / Life Support Systems
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	10.334	14.624	23.660	0.000	23.660	23.973	24.412	24.858	25.326	Continuing	Continuing
65412A: Life Support Systems	-	10.334	14.624	23.660	0.000	23.660	23.973	24.412	24.858	25.326	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This program saves Airmen's lives and improves aircrew performance through better aircrew flight equipment and airman combat systems. Air Force acquisition teams lead the upgrade and fielding of new equipment/systems by assessing deficiencies in existing equipment, identifying and assessing existing products or developing new technology, and conducting required Safe-to-Fly tests, certifications, and studies. Program efforts include, but are not limited to, the following projects: directed energy protective equipment; flight helmets and visors; oxygen breathing systems for aircrew; radios and locator beacons; support equipment; nuclear flash blindness protection; night vision devices; noise reduction devices; anti-gravity (anti-G) suits; flame resistant, retardant and blast/ballistic protective gear; aircraft seating; impact protection equipment; flotation devices; parachutes; ejection seats; physiological monitoring devices and other aircrew/life support/ground crew systems required by the warfighter.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Life Support capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	8.919	8.624	18.701	0.000	18.701
Current President's Budget	10.334	14.624	23.660	0.000	23.660
Total Adjustments	1.415	6.000	4.959	0.000	4.959
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	6.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.415	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	4.959	0.000	4.959

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604706F / <i>Life Support Systems</i>
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<b>Congressional Add Details (\$ in Millions, and Includes General Reductions)</b>	FY 2019	FY 2020
<b>Project:</b> 65412A: <i>Life Support Systems</i> Congressional Add: <i>Next Generation Ejection Seat Congressional Add</i>	0.000	6.000
Congressional Add Subtotals for Project: 65412A	0.000	6.000
Congressional Add Totals for all Projects	0.000	6.000

**Change Summary Explanation**

FY19-Below threshold reprogramming to support female aircrew flight equipment  
 FY20-Congressional add in support of Next Generation Ejection Seat  
 FY21 increase to fund Female flight gear

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> Aircrew Performance Studies/Technology Projects and Minor Development Efforts  <b>Description:</b> Air Force Life Cycle Management Center's Aircrew Performance Branch is the single USAF focal point for Aircrew Flight Equipment (AFE) Safe-to-Fly (STF) testing certification, addressing Safety Investigation Board (SIB) recommendations, along with studies and analysis. In addition, funding is for efforts that are responses to real-time capability gaps identified by the warfighter which may be satisfied by testing and qualifying commercial-off-the-shelf (COTS) products and/or performing minor development efforts that require less than \$10M per year related to aircrew flight equipment and life support equipment. Previous successful efforts may evolve into enduring capabilities as other users / MAJCOMs seek to incorporate these STF assets into their inventory. Aircrew Body Armor (ABA), BA-X Low Profile Parachute (LPP) and Nuclear Flash Blindness Goggles (NFBG) are currently the active programs within Life Support Systems (LSS). Funds may be used to address associated emerging aircrew/ground crew/egress requirements and for program management activities.  <b>FY 2020 Plans:</b> Perform STF testing and certification of COTS products. Address SIB recommendations. Continue the development/test efforts of aircrew laser eye protection (ALEP), radio upgrades, next generation fixed wing helmet, next generation nuclear flash blindness technology, and improvement of parachute/flotation devices.  <b>FY 2021 Plans:</b> Perform STF testing and certification of COTS products. Address SIB recommendations. Continue the development/test efforts of aircrew laser eye protection (ALEP) for the visor option, radio upgrades, next generation fixed wing helmet, next generation nuclear flash blindness technology, and improvement of parachute/flotation devices.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>	5.583	5.002	8.655



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604706F / <i>Life Support Systems</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Increase in funding due to the increase in work on the ALEP Block 3 program as well as Next Generation Fixed Wing Helmet and female airmen received a plus up in FY21 making funds available to expedite these efforts.				
<p><b>Title:</b> Integrated Aircrew Ensemble (IAE)</p> <p><b>Description:</b> The Integrated Aircrew Ensemble (IAE) is a multi-layer battle ready system of protective clothing, survival equipment, and anti-G protection equipment worn by aircrew members. The ensemble can layer up to seven (7) components allowing for flexible combinations depending on aircraft type, mission, and threat. Each component design is unique but engineered as a single integrated ensemble to improve mobility by reducing bulk, reducing aircrew fatigue from thermal stress using new breathable materials, and increasing overall system performance. The ensemble components are: 1) outer flight layer, 2) Environmental Protection Layer (EPL) with gloves, 3) Chemical Biological Radiological Layer (CBRL) with glove inserts, 4) Life Preserver Unit (LPU), 5) Counter Chest Pressure Bladder (CCPB), 6) survival vest, and 7) G-suit.</p> <p><b>FY 2020 Plans:</b> Begin initial work on the IAE G-Suit deficiency correction.</p> <p><b>FY 2021 Plans:</b> Complete work on the IAE G-Suit deficiency correction and related testing.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> RDT&amp;E for IAE is schedule to complete in FY20</p>		0.737	0.197	0.000
<p><b>Title:</b> Advanced Concept Ejection Seat</p> <p><b>Description:</b> Ejection Seat upgrade for first platform</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> N/A</p>		0.005	0.000	0.000
<p><b>Title:</b> Next Generation Ejection Seat</p> <p><b>Description:</b> The new ejection seat escape system shall safely accommodate greater variation in aircrew minimum/maximum weights, a minimum aircrew sitting height of 31 inches, and the use of Helmet Mounted Displays. It shall reduce the risk of injuries to the arms and legs (especially limb flail), neck, and spinal column throughout the entire ejection event.</p> <p><b>FY 2020 Plans:</b></p>		0.464	0.000	10.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604706F / <i>Life Support Systems</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Congressional Add Description above				
<p><b>FY 2021 Plans:</b> Continuing EMD contract effort awarded as part of Congressional add to begin qualification testing of selected seat and receive long lead items.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Planned increase to continue EMD contract effort awarded as part of Congressional add to begin qualification testing of selected seat and receive long lead items.</p>				
<p><b>Title:</b> Female Airmen Equipment</p> <p><b>Description:</b> Air Force Life Cycle Management Center's Aircrew Performance Branch is the single USAF focal point for Female Airmen Equipment (AFE) Safe-to-Fly (STF) testing certification, addressing Safety Investigation Board (SIB) recommendations, along with studies and analysis. In addition, funding is for efforts that are responses to real-time capability gaps identified by the warfighter which may be satisfied by testing and qualifying commercial-off-the-shelf (COTS) products and/or performing minor development efforts that require less than \$10M per year related to aircrew flight equipment and life support equipment. Funds development of organizational issued equipment (OCIE) &amp; personal protective equipment (PPE) for female Airmen to enhance mission performance while improving safety and survival.</p> <p><b>FY 2020 Plans:</b> Continue testing and development of female flight equipment. Female flight suit development is anticipated to begin, additional efforts will be worked as requirements are defined.</p> <p><b>FY 2021 Plans:</b> Continue testing and development of female flight equipment. Items anticipated to be worked, but not limited to, include the female flight suit development, new female flight harness, and bladder relief.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Not a new start, female aircrew efforts were previously worked in the "Aircrew Performance Studies/Technology Projects and Minor Development Efforts" line. However, with a plus up in FY21 it is appropriate to provide more specificity.</p>		3.545	3.425	5.005
<b>Accomplishments/Planned Programs Subtotals</b>		10.334	8.624	23.660
		<b>FY 2019</b>	<b>FY 2020</b>	
<b>Congressional Add:</b> Next Generation Ejection Seat Congressional Add		0.000	6.000	

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604706F / <i>Life Support Systems</i>
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	FY 2019	FY 2020
<b>FY 2019 Accomplishments:</b> Continuing program costs associated with pre-award EMD contract effort to begin qualification testing of selected seat and receive long lead items. Cost captured under Next Generation Ejection Seat Major Thrust.		
<b>FY 2020 Plans:</b> Award EMD contract for initial platform qualification testing		
<b>Congressional Adds Subtotals</b>	0.000	6.000

**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 04 Line Item 842990: <i>Items Less Than \$5 Million</i> <i>(Safety and Rescue Equipment)</i>	33.473	40.540	24.407	-	24.407	116.102	138.835	54.072	55.085	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**

The majority of efforts funded in this project employ a streamlined acquisition approach. Whenever practical, Government-Off-The-Shelf/Commercial-Off-The-Shelf (GOTS/COTS) items are tested and evaluated as candidates for solutions to user needs. This normally involves characterization, verification, and qualification testing to ensure GOTS/COTS equipment is properly certified and adapted for military purposes. However, acquisition strategies may be carried out at the project level for traditional Engineering and Manufacturing Development (EMD), e.g., Integrated Aircrew Ensemble (IAE) and Aircrew Laser Eye Protection (ALEP) Block III. Funds may be used to address associated emerging aircrew/ground crew/egress requirements and for program management activities.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604706F / Life Support Systems	<b>Project (Number/Name)</b> 65412A / Life Support Systems
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Aircrew Performance Studies/Technology Projects/Minor Development Efforts	Various	Multiple Contractors : TBD	-	3.366		3.044		6.344		-		6.344	Continuing	Continuing	-
Integrated Aircrew Ensemble (IAE)	C/FPIF	Tiax : Lexington, MA	-	0.767	Feb 2019	0.180	Jan 2020	0.081	Jan 2021	-		0.081	Continuing	Continuing	-
Next Generation Ejection Seat	SS/FPIF	Collins Aerospace : Colorado Springs, CO	-	0.650	Apr 2019	6.000	Feb 2020	9.450	Oct 2020	-		9.450	Continuing	Continuing	-
Female Flight Equipment	Various	Multiple Contractors : TBD	-	3.425	Aug 2019	3.425	Dec 2019	4.815	Dec 2020	-		4.815	Continuing	Continuing	-
<b>Subtotal</b>			-	8.208		12.649		20.690		-		20.690	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Tests (IAE, ACES, NGFWH, etc.)	Various	Various : Various, NV	-	1.325		1.250		1.650		-		1.650	Continuing	Continuing	-
<b>Subtotal</b>			-	1.325		1.250		1.650		-		1.650	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration (PMA)	TBD	AFLCMC : Wright-Patterson AFB, OH	-	0.801		0.725		1.320		-		1.320	Continuing	Continuing	-
<b>Subtotal</b>			-	0.801		0.725		1.320		-		1.320	Continuing	Continuing	N/A

**Remarks**  
PMA Description: Program Management Support and Travel.



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**Exhibit R-4, RDT&E Schedule Profile:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604706F / <i>Life Support Systems</i>	<b>Project (Number/Name)</b> 65412A / <i>Life Support Systems</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Life Support Systems RDTE Efforts</i></b>																																
IAE [Initial Operational Test & Evaluation]																																
IAE [G-Suit Redesign]																																
Next Generation Ejection Seat Pre-Contract Award Activities																																
Next Generation Ejection Seat Contract Award																																
Next Generation Ejection Seat Qualification Effort																																
Aircrew Performance Aircrew Laser Eye Protection Day Development																																
Aircrew Performance Aircrew Laser Eye Protection Night Development																																
Aircrew Performance Aircrew Laser Eye Protection Ballistic Specs																																
Aircrew Performance Next Generation Fixed Wing Helmet Development Award																																
Continue projects in support of Aircrew Performance/Female Equipment																																

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604706F / <i>Life Support Systems</i>	<b>Project (Number/Name)</b> 65412A / <i>Life Support Systems</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Life Support Systems RDTE Efforts</i></b>				
IAE [Initial Operational Test & Evaluation]	1	2019	4	2019
IAE [G-Suit Redesign]	1	2020	3	2021
Next Generation Ejection Seat Pre-Contract Award Activities	1	2019	4	2020
Next Generation Ejection Seat Contract Award	4	2020	4	2020
Next Generation Ejection Seat Qualification Effort	4	2020	4	2025
Aircrew Performance Aircrew Laser Eye Protection Day Development	1	2020	3	2020
Aircrew Performance Aircrew Laser Eye Protection Night Development	2	2020	2	2021
Aircrew Performance Aircrew Laser Eye Protection Ballistic Specs	3	2021	3	2022
Aircrew Performance Next Generation Fixed Wing Helmet Development Award	1	2020	1	2021
Continue projects in support of Aircrew Performance/Female Equipment	1	2019	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604735F / <i>Combat Training Ranges</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	42.383	52.365	8.898	0.000	8.898	23.959	24.384	171.178	315.767	Continuing	Continuing
652286: <i>Combat Training Range Equipment</i>	-	42.383	52.365	8.898	0.000	8.898	23.959	24.384	171.178	315.767	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Combat Training Ranges (CTR) program provides equipment and support to Air Force units and combat training ranges for electronic warfare (EW) mission testing, training, and evaluation of aircrews, as well as operational testing of weapon systems and tactics under simulated combat conditions. This program provides funding for the development and integration of EW training capabilities to include: Air Combat Training Systems (ACTS); threat emitters; advanced radar threat systems; communication jammers; command and control and debrief capability; and instrumentation equipment/systems. These systems and capabilities support integrated training operations for all aircraft (including 5th Generation) and for Joint, Coalition, and Live, Virtual, Constructive (LVC) training events.

The Advanced Radar Threat System (ARTS) programs design, develop, build, and test threat systems based on advanced foreign fielded surface-to-air missile (SAM) radar threat systems. The ARTS variants will be used at Department of Defense (DoD) training ranges for 4th and 5th Generation aircrew training and tactics development to increase combat effectiveness and aircrew survivability by training aircrews to engage or defend against an advanced SAM threat before encountering it in actual combat to stress their tactics, techniques and procedures. The ARTS programs support early research, studies, technology development, and planning for next-generation threat systems. The ARTS programs also fund development of high-fidelity surrogate targets matching simulated threat systems to stress 5th Generation sensor fusion capabilities.

The Modernization Range Threats Systems (RTS) efforts fund development of modifications for range threat systems to provide continued combat training relevancy and enhanced systems capabilities. RTS efforts include Multiple Threat Emitter System (MUTES), Miniature Multiple Threat Emitter System (Mini-MUTES), Modular Threat Emitter (MTE) system, Tactical Radar Threat Generator (TRTG) system, Band Simulator, Unmanned Modular Threat Emitter (UMTE) system, and legacy Joint Threat Emitter (JTE) systems. Enhancements focus on upgrading threat systems to match fielded modifications for foreign threat systems faced by combat aircrews. The Common Electronic Attack Receiver (CEAR) provides reactive training and enhanced debriefs using legacy threats. The Modernization Systems effort upgrades Band Simulator and other legacy emitters with modern electronics to improve threat relevance and sustainability. The Double Digit Threat Emitter (DDTE) effort leverages JTE to provide greater on-range threat density of advanced SAM radars. The B-Pedestal modification will provide double-digit threat capability to Mini-MUTES B-Pedestals.

The P5 Combat Training System (P5 CTS) program addresses new capability requirements for the fielded P5 system, to include continued operations in a global positioning system (GPS)-contested environment. This will enable ongoing analyses, studies, risk reduction efforts, and/or technology development to enhance Operational Training Infrastructure (OTI), such as combat training range equipment integration into a blended training architecture, communication and GPS jammers,

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604735F / <i>Combat Training Ranges</i>
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weapon drop scoring systems, and infrastructure networks. These enhancements will add a critical dimension to exercises and optimize warfighter training throughout the program's lifecycle.

The Live Mission Operations Capability (LMOC) will regionalize and standardize training airspace, threat systems, and control centers to better challenge 5th Generation aircraft and aircrew and provide comprehensive training support for warfighters. It will provide a node-based enterprise that integrates all range system capabilities, including pre/post mission coordination, in a multi-level secure environment to enable blended training for combat and combat support units, including F-35. It will address three combat training capability requirements: build and display an integrated surface and air picture; manage training; and enable LVC training operations.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Combat Training Ranges weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	43.895	37.365	8.915	0.000	8.915
Current President's Budget	42.383	52.365	8.898	0.000	8.898
Total Adjustments	-1.512	15.000	-0.017	0.000	-0.017
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	15.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.460	0.000			
• Other Adjustments	-0.052	0.000	-0.017	0.000	-0.017

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 652286: *Combat Training Range Equipment*

Congressional Add: *F-35 Advanced Threat Simulator*

	<b>FY 2019</b>	<b>FY 2020</b>
	8.000	15.000
Congressional Add Subtotals for Project: 652286	8.000	15.000
Congressional Add Totals for all Projects	8.000	15.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604735F / <i>Combat Training Ranges</i>		
<b>Change Summary Explanation</b> FY19 \$1.46M reduction for Small Business Innovation Research (SBIR) FY20 Congressional add for \$15M F-35 advanced threat simulator				
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> P5 Combat Training System (CTS)		0.175	0.200	0.500
<b>Description:</b> P5 CTS funding supports ACTS capabilities and includes the development, integration and testing of future software/hardware upgrades, aircraft/pod integration, upgrades for range applications, and associated studies. Additionally, funding supports efforts to enable initial training interoperability with 5th Generation aircraft via Ground Subsystem (GS) decryption of secure (encrypted) Time, Space, Position Information (TSPI), weapon simulation, and other training data.				
<b>FY 2020 Plans:</b> Funding supports the study, development and test of a Production Representative Article (PRA) for global positioning system (GPS)-contested training upgrade for P5 CTS. Funding is also being used to study optimization of message format and priority in support of Proficiency-Based Training (PBT) objectives.				
<b>FY 2021 Plans:</b> Funding will continue to support the study, development and test of a PRA for GPS-contested training upgrade for P5 CTS. Funding is also being used to study optimization of message format and priority in support of PBT objectives.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased due to procurement of prototype hardware required for system qualification.				
<b>Title:</b> Modernization Range Threat Systems (RTS)		0.000	0.150	0.000
<b>Description:</b> Modernization Systems efforts fund development of modifications for range threat systems to provide continued combat training relevancy and enhanced systems capabilities. Range threat systems include MUTES, Mini-MUTES, MTE system, TRTG system, Band Sim, UMTE system, legacy JTE system, and other radar systems fielded throughout the combat training range enterprise. Enhancements focus on upgrading threat systems to match fielded modifications for foreign threat systems faced by combat aircrews. The CEAR provides reactive training and enhanced debriefs using legacy threats. The Modernization Systems effort upgrades the Band Sim and other legacy emitters with modern electronics to improve threat relevance and sustainability. The DDTE effort leverages JTE to provide greater on-range threat density of advanced SAM radars.				
<b>FY 2020 Plans:</b> Funding supports preparation for Mini-MUTES modification for improved threat relevance and required relevancy upgrades to support Joint Pacific Alaska Range Complex (JPARC) legacy systems.				
<b>FY 2021 Plans:</b>				

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604735F / <i>Combat Training Ranges</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to realignment of priorities to other projects within Combat Training Ranges.				
<b>Title:</b> Advanced Radar Threat System (ARTS-V1)		3.788	13.100	6.457
<b>Description:</b> ARTS-V1 program will design, develop, build and test radar threat systems based on advanced strategic, long-range, re-locatable foreign fielded Surface-to-Air Missile (SAM) radar threat systems. ARTS-V1 will leverage an existing DoD test resource development program to reduce non-recurring development cost, minimize schedule risk, and promote range interoperability between test and training. While various aircraft platforms will train against ARTS-V1, the focus of the program is to develop realistic radar threat systems meant to stress 5th Generation aircraft capabilities. Additionally, development of a high-fidelity surrogate target, ongoing analyses, studies, and risk reduction efforts will focus on integrating ARTS and other systems into regional range and LVC architectures.				
<b>FY 2020 Plans:</b> Funding supports the development of a PRA and integration and testing, along with Technical Data Package (TDP) development. Additionally, funding is supporting ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.				
<b>FY 2021 Plans:</b> Funding will support further development (technical design reviews, integration, fabrication and testing) of a Production Representative Article (PRA) along with finalization of the TDP. Additionally, funding will support ongoing analyses and studies focused on integrating Advanced Radar Threat System (ARTS) into regional range and Live, Virtual, Constructive (LVC) architectures.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to finalization of PRA activities.				
<b>Title:</b> Advanced Radar Threat System (ARTS-V2)		29.670	10.200	1.741
<b>Description:</b> ARTS-V2 program will design, develop, build and test radar threat systems based on an advanced tactical, mobile, short/medium range foreign fielded SAM radar threat system. Additionally, development of a high-fidelity surrogate target, ongoing analyses, studies, and risk reduction efforts will focus on integrating ARTS-V2 and other systems into LVC architectures.				
<b>FY 2020 Plans:</b>				

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604735F <i>I Combat Training Ranges</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Funding supports the development (technical design reviews, integration, fabrication and testing) of a PRA under the Engineering Manufacturing and Development (EMD) contract. Additionally, funding is supporting ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.</p> <p><b>FY 2021 Plans:</b> Funding will support completion of the development (technical design reviews, integration, fabrication and testing) of a PRA under the EMD contract. Additionally, funding will support ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to conclusion of PRA activities.</p>				
<p><b>Title:</b> Advanced Radar Threat System (ARTS-V3)</p> <p><b>Description:</b> ARTS-V3 program will design, develop, build and test advanced surface-to-air threat systems replicating strategic/tactical threat(s) at the fidelity necessary to stress current EW systems, 5th Generation and beyond air platform engagements and be integrated into a future Combat Air Forces (CAF) LVC system. ARTS-V3 will provide an anti-access/area denial (A2/AD) environment for CAF test and training with highly reactive threat systems that provide immediate feedback to aircrews. The ARTS-V3 system will create a relevant combat training threat system that is dynamic and represents a modern and dynamic adversary force.</p> <p><b>FY 2020 Plans:</b> Funding supports intelligence, early research, studies, risk reduction, and technology maturation to reduce program risk. Funds are supporting intelligence data to ensure emulation of the real world system is relevant and realistic.</p> <p><b>FY 2021 Plans:</b> Funding will continue intelligence and requirements support, early research, studies, risk reduction, support technology maturation, prototyping, and reduce program risk. Funds will also support intelligence data to ensure emulation of the real world system is relevant and realistic.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to realignment of priorities to other projects within Combat Training Ranges.</p>		0.000	5.183	0.100
<p><b>Title:</b> Advanced Radar Threat System (ARTS-V4)</p> <p><b>Description:</b> ARTS-V4 program will design, develop, build, and test modern surface-to-air threat systems replicating tactical highly mobile threats at the fidelity necessary to stress current EW systems, 5th Generation and beyond air platform engagements, and be integrated into a future CAF LVC system. The ARTS-V4 system will create a relevant combat training threat</p>		0.000	1.540	0.100

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604735F / <i>Combat Training Ranges</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>system that is dynamic and represents adversary forces. Additionally funding will support ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.</p> <p><b>FY 2020 Plans:</b> Funding supports finalizing program foundation to include intelligence and requirements support, early research, studies, support technology maturation and demonstration, and planning to support a Milestone B decision. Funding acquires intelligence data to ensure emulation of the real world system is relevant and realistic.</p> <p><b>FY 2021 Plans:</b> Funding will continue intelligence and requirement support, early research, studies, risk reduction, support technology maturation, prototyping and reduce program risk. Funding will also support intelligence data to ensure emulation of the real work system is relevant and realistic.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to realignment of priorities to other projects within Combat Training Ranges.</p>				
<p><b>Title:</b> Modular Threat Emitter (MTE)</p> <p><b>Description:</b> MTE will conduct RDT&amp;E to modernize the Range Threat family of systems, focusing on the MTE System. Foreign fielded SAM threat systems have undergone major modernization programs to replace aging analog technology with modern digital electronics. This program requires the development of digital electronics upgrades to provide realistic electronic warfare training to combat aircrews. This effort will improve threat fidelity (ensuring threat-representative Radio Frequency (RF) emissions), increase reliability, maintainability, supportability, system mobility, and support remote operations with Digital Integrated Air Defense Systems (DIADS). This effort supports warfighter development of new tactics, techniques, and procedures in a relevant, realistic combat environment.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>		0.400	0.000	0.000
<p><b>Title:</b> Live Mission Operations Capability (LMOC)</p> <p><b>Description:</b> LMOC will regionalize and standardize training airspace, threat systems, and control centers to better challenge 5th Generation aircraft and aircrew and provide comprehensive training support for all warfighters. It will provide a node-</p>		0.350	6.992	0.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604735F / <i>Combat Training Ranges</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
based enterprise that integrates all range system capabilities, including pre/post mission coordination, in a multi-level secure environment to enable blended live-synthetic training for combat and combat support units including F-35. It will address three combat training capability requirements: build and display an integrated surface and air picture; manage training; and enable LVC training operations.  <b>FY 2020 Plans:</b> Funding supports initial stand-up of a system integration laboratory, further risk reduction activities and requirement documentation to ensure quick and incremental fielding of capability.  <b>FY 2021 Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to realignment of priorities to other projects within Combat Training Ranges.			
<b>Accomplishments/Planned Programs Subtotals</b>	34.383	37.365	8.898

	FY 2019	FY 2020
<b>Congressional Add:</b> F-35 Advanced Threat Simulator  <b>FY 2019 Accomplishments:</b> FY19 funding is being used to study enhancements to legacy systems capable of providing advanced Surface-to-Air Missile (SAM) threats through integration of commercial off-the-shelf or previously developed technology into existing systems at JPARC.  <b>FY 2020 Plans:</b> FY20 funding will be used to design, develop, and install digital upgrades to improve the fidelity and Electronic Warfare (EW) scenarios for F-35 and other aircrews during Live, Virtual and Constructive test and training events, increasing warfighter interoperability and survivability.	8.000	15.000
<b>Congressional Adds Subtotals</b>	8.000	15.000

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 834190: <i>Combat Training Ranges</i>	227.598	282.893	195.185	-	195.185	237.288	177.931	178.051	170.354	Continuing	Continuing
• OPAF 05 Line Item 861900: <i>Spares and Repair Parts</i>	14.035	2.322	8.241	-	8.241	19.082	11.413	0.737	0.750	Continuing	Continuing

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604735F / <i>Combat Training Ranges</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 07 Line Item 000075: <i>Other Production Charges</i>	13.842	0.300	3.495	-	3.495	0.300	0.300	0.300	0.305	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**

The acquisition strategy varies by effort. Overall strategy is competition focused, with both cost plus and fixed price contracts.



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604735F / <i>Combat Training Ranges</i>	<b>Project (Number/Name)</b> 652286 / <i>Combat Training Range Equipment</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Advanced Radar Threat System-Variant 1 (ARTS-V1) Development	Various	Various : Pax River, MD	-	3.788	Jun 2019	9.000	Dec 2019	6.732	Oct 2020	-		6.732	Continuing	Continuing	-
Advanced Radar Threat System-Variant 2 (ARTS-V2) Development	C/FPIF	Lockheed Martin : Grand Prairie, TX	-	26.488	Jan 2019	8.600	Nov 2019	0.246	Sep 2021	-		0.246	Continuing	Continuing	-
Advanced Radar Threat System-Variant 4 (ARTS-V4) Development	Various	Various : Hill AFB, UT	-	-		0.840	Nov 2019	-		-		-	Continuing	Continuing	-
P5 CTS GPS Contested	Various	Various : Hill AFB, UT	-	0.175	Sep 2019	0.200	Feb 2020	0.500	Apr 2021	-		0.500	Continuing	Continuing	-
Live Mission Operation Capability (LMOC)	Various	Various : Hill AFB, UT	-	0.350	Sep 2019	6.192	Mar 2020	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	30.801		24.832		7.478		-		7.478	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Advanced Radar Threat Systems (Direct Msn Spt)	Various	Various : Various, NV	-	-		5.183	Dec 2019	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	-		5.183		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Advanced Radar Threat Systems (Direct Msn Spt)	C/Various	Not specified. : TBD	-	-		2.600	Jun 2020	1.420	Oct 2020	-		1.420	Continuing	Continuing	-
<b>Subtotal</b>			-	-		2.600		1.420		-		1.420	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Air Force</b>											<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 3600 / 5						<b>R-1 Program Element (Number/Name)</b> PE 0604735F / <i>Combat Training Ranges</i>					<b>Project (Number/Name)</b> 652286 / <i>Combat Training Range Equipment</i>				

<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Advanced Radar Threat Systems (PMA/A&AS)	Various	Various : Hill AFB, UT	-	3.182	Jun 2019	3.800	May 2020	-		-		-	Continuing	Continuing	-
Live Mission Operations Capability (LMOC) (PMA/A&AS)	Various	AFLCMC/AZS : Hill AFB, UT	-	-		0.800	Feb 2020	-		-		-	Continuing	Continuing	-
Modernization Systems (PMA/A&AS)	Various	AFLCMC/AZS : Hill AFB, UT	-	8.400	Jun 2019	15.000	Jun 2020	-		-		-	Continuing	Continuing	-
Modernization Systems (RTS) (PMA/A&AS)	Various	AFLCMC/AZS : Hill AFB	-	-		0.150	Apr 2020	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	11.582		19.750		-		-		-	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	42.383		52.365		8.898		-		8.898	Continuing	Continuing	N/A

**Remarks**  
 FINANCIAL PERFORMANCE: Combat Training Ranges is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, however, the ARTS-V2 development contract is an FPIF contract with progress payments. 20 percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604735F / <i>Combat Training Ranges</i>	<b>Project (Number/Name)</b> 652286 / <i>Combat Training Range Equipment</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Modernization Systems																												
Live Mission Operations Capability (LMOC)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604735F / <i>Combat Training Ranges</i>	<b>Project (Number/Name)</b> 652286 / <i>Combat Training Range Equipment</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Combat Training Range Equipment</i></b>				
P5CTS Development	4	2019	4	2022
-- P5 CTS GPS-Contested Training Operation Capability	4	2019	4	2022
Advanced Radar Threat System-Variant 1(ARTS-V1) EMD Phase	1	2019	3	2022
-- ARTS-V1 Develop First Article (PRA)	1	2019	2	2021
-- ARTS-V1 Factory Acceptance Test	2	2021	2	2021
-- ARTS-V1 DT-E AND OT-E	3	2021	2	2022
-- ARTS-V1 Milestone C	3	2022	3	2022
Advanced Radar Threat System-Variant 2 (ARTS-V2) EMD Phase	1	2019	4	2021
-- ARTS-V2 PRA Contract	1	2019	4	2021
-- ARTS-V2 CDR	1	2019	1	2019
-- ARTS-V2 DT-E and OT-E	3	2020	3	2021
-- ARTS-V2 Milestone C	4	2021	4	2021
Advanced Radar Threat System-Variant 3 (ARTS-V3) System Spec Definition	1	2019	2	2022
-- ARTS-V3 First Intel Assessment	1	2019	4	2019
-- ARTS-V3 Second Intel Assessment	2	2020	1	2021
-- ARTS-V3 Third Intel Assessment	2	2022	1	2024
Advanced Radar Threat System-Variant 4 (ARTS-V4) Pre-milestone B	1	2019	1	2021
-- ARTS-V4 Milestone B	2	2023	2	2023
-- ARTS-V4 Development	2	2023	4	2025
-- ARTS-V4 Milestone C	4	2025	4	2025
Modernization Systems	3	2019	2	2020

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604735F / <i>Combat Training Ranges</i>	<b>Project (Number/Name)</b> 652286 / <i>Combat Training Range Equipment</i>

<b>Events by Sub Project</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
Live Mission Operations Capability (LMOC)	2	2019	4	2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD
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COST (\$ in Millions)	Prior Years <sup>(+)</sup>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	51,175.835	67.999	7.628	5.423	0.000	5.423	0.000	0.000	0.000	0.000	0.000	51,256.885
653831: <i>Joint Strike Fighter</i>	50,956.248	67.999	7.628	5.423	0.000	5.423	0.000	0.000	0.000	0.000	0.000	51,037.298

**Program MDAP/MAIS Code:** 198

<sup>(+)</sup> The sum of all Prior Years is \$219.587 million less than the represented total due to several projects ending

**A. Mission Description and Budget Item Justification**

The F-35 Joint Strike Fighter (JSF) Program will develop and field an affordable, highly common family of next generation strike aircraft for the USN, USAF, USMC and allies. The three variants are the F-35A Conventional Takeoff and Landing; F-35B Short Takeoff and Vertical Landing; and the F-35C Aircraft Carrier suitable variant. The F-35A will be a stealthy multi-role aircraft, primary air-to-ground for the Air Force to replace the F-16 and A-10 and complement the F-22. The F-35B variant will be a multi-role strike fighter aircraft to replace the AV-8B and F/A-18 for the Marine Corps, replace the Sea Harrier and GR 7 for the United Kingdom, and replace the AV-8 currently employed by the Italian Navy. The F-35C will provide the Department of the Navy a multi-role, stealthy strike fighter aircraft to complement the F/A-18E/F.

The United Kingdom, Italy, Netherlands, Canada, Australia, Denmark, Norway, and Foreign Military Sales customers are also participants in the JSF program. The program shown here reflects USN, USMC, USAF, and International Partner funding.

Funding at the accomplishment/planned program level is reported as the total of all services and partners as these activities support all aircraft variants.

The System Development and Demonstration (SDD) budget funds a total quantity of 20 RDT&E test articles to include 6 ground test articles and 14 flight test articles for USN, USAF, and USMC use.

- FY07: 1 F-35A flight test article
- FY08: 1 F-35B flight test article; 1 F-35B ground test article
- FY09: 1 F-35B flight test article; 2 F-35A ground test articles
- FY10: 6 flight test articles: 3 F-35A, 2 F-35B, 1 F-35C; 3 ground test articles: 1 F-35B, 2 F-35C
- FY11: 4 flight test articles: 1 F-35A, 1 F-35B, 2 F-35C
- FY13: 1 F-35C flight test article

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	69.001	7.628	5.434	0.000	5.434
Current President's Budget	67.999	7.628	5.423	0.000	5.423
Total Adjustments	-1.002	0.000	-0.011	0.000	-0.011
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-0.118	0.000			
• SBIR/STTR Transfer	-0.884	0.000			
• Other Adjustments	0.000	0.000	-0.011	0.000	-0.011

**Change Summary Explanation**

No significant Changes



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD				<b>Project (Number/Name)</b> 653831 / Joint Strike Fighter			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
653831: <i>Joint Strike Fighter</i>	50,956.248	67.999	7.628	5.423	0.000	5.423	0.000	0.000	0.000	0.000	0.000	51,037.298
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Total cost including United States Navy (USN), United States Marine Corps (USMC), International partner contributions and United States Air Force (USAF) funding are: FY19 \$191.460M, FY20 \$10.828M, and FY21 \$6.234M. R-2 data reflects variant unique funding only.

R-2A(section B)/R-3 displays total combined Program (i.e. not Service specific), including International partners.

F-35 EMD Includes:

- USAF PE 0604800F BPAC 653831
- USN PE 0604800N Project Unit 2261
- USMC PE 0604800M Project Unit 2262

D&S Includes:

- USAF PE 0604800F BPAC 653832
- USN PE 0604800N Project Unit 3352
- USMC PE 0604800M Project Unit 3350

**A. Mission Description and Budget Item Justification**

The F-35 Joint Strike Fighter (JSF) Program will develop and field an affordable, highly common family of next generation strike aircraft for the USN, USAF, USMC and allies. The three variants are the F-35A Conventional Takeoff and Landing; F-35B Short Takeoff and Vertical Landing; and the F-35C Aircraft Carrier suitable variant. The F-35A will be a stealthy multi-role aircraft, primary air-to-ground for the Air Force to replace the F-16 and A-10 and complement the F-22. The F-35B variant will be a multi-role strike fighter aircraft to replace the AV-8B and F/A-18 for the Marine Corps, replace the Sea Harrier and GR 7 for the United Kingdom, and replace the AV-8 currently employed by the Italian Navy. The F-35C will provide the Department of the Navy a multi-role, stealthy strike fighter aircraft to complement the F/A-18E/F.

The United Kingdom, Italy, Netherlands, Canada, Australia, Denmark, Norway, and Foreign Military Sales customers are also participants in the JSF program. The program shown here reflects USN, USMC, USAF, and International Partner funding.

The top-line Program Element reflects the unique variant for each Service. Funding at the accomplishment/planned program level is reported as the total of all services and partners as these activities support all aircraft variants.

The System Development and Demonstration (SDD) budget funds a total quantity of 20 RDT&E test articles to include 6 ground test articles and 14 flight test articles for USN, USAF, and USMC use.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD	<b>Project (Number/Name)</b> 653831 / Joint Strike Fighter
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FY07: 1 F-35A flight test article  
 FY08: 1 F-35B flight test article; 1 F-35B ground test article  
 FY09: 1 F-35B flight test article; 2 F-35A ground test articles  
 FY10: 6 flight test articles: 3 F-35A, 2 F-35B, 1 F-35C; 3 ground test articles: 1 F-35B, 2 F-35C  
 FY11: 4 flight test articles: 1 F-35A, 1 F-35B, 2 F-35C  
 FY13: 1 F-35C flight test article

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><b>Title:</b> System Development and Demonstration (SDD) (F-35 JSF)</p> <p><b>Description:</b> SDD execution of the Air System with (Lockheed Martin), including International Commonality Effort which includes airframe, vehicle systems, mission systems, autonomic logistics, systems engineering, and integrated test efforts.</p> <p><b>FY 2020 Plans:</b> Continue SDD execution of the Air System with (Lockheed Martin), including International Commonality Effort which includes, airframe, vehicle systems, mission systems, autonomic logistics, systems engineering, and integrated test efforts. Activity aligned to IMS in accordance with variant IOC. Conduct SDD closure activities including FCA/PCA( Functional Configuration Audit/Production Configuration Audit) in order to establish production specification and transition to post-SDD, production and sustainment.</p> <p><b>FY 2021 Base Plans:</b> Continue SDD execution of the Air System with (Lockheed Martin), including International Commonality Effort which includes, airframe, vehicle systems, mission systems, autonomic logistics, systems engineering, and integrated test efforts. Activity aligned to IMS in accordance with variant IOC. Conduct SDD closure activities including FCA/PCA( Functional Configuration Audit/Production Configuration Audit) in order to establish production specification and transition to post-SDD, production and sustainment.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 funding decrease is due to reduction in domestic and International controls as SDD phase draws to closure.</p>	103.767	10.828	6.234	0.000	6.234
<p><b>Title:</b> Test and Evaluation (T&amp;E) (F-35 JSF)</p>	64.613	0.000	0.000	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD	<b>Project (Number/Name)</b> 653831 / Joint Strike Fighter

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p><b>Description:</b> Government-executed Initial Operational Test &amp; Evaluation (IOT&amp;E) activities. Elements of IOT&amp;E include preparation, execution, &amp; evaluation of flight and ground based tests which assess all aspects (lethality, mission effectiveness, cyber security) of the F-35 Air System in an operationally relevant environment.</p> <p><b>FY 2020 Plans:</b> IOT&amp;E conclusion and reporting requirements.</p> <p><b>FY 2021 Base Plans:</b> N/A</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>					
<p><b>Title:</b> Development Support (F-35 JSF)</p> <p><b>Description:</b> SDD Support efforts for airframe, air vehicle systems, mission systems, weapons integration, mission support, and autonomic logistics development activities.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Base Plans:</b> N/A</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	23.080	0.000	0.000	0.000	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	191.460	10.828	6.234	0.000	6.234
Other Service Funding Adjustment	123.461	3.200	0.811	-	0.811
<b>Air Force Subtotals</b>	67.999	7.628	5.423	0.000	5.423

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD	<b>Project (Number/Name)</b> 653831 / Joint Strike Fighter

**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	Total Cost
			Base	OCO	Total					Complete	
• RDTE 05 PE 0604800N 2261: JSF SDD (CV)	58.769	1.490	0.250	-	0.250	0.264	0.247	0.247	0.252	0.000	61.519
• RDTE 05 PE 0604800N 3352: F-35C Sustainment/ Capability Enhancements (CV)	4.766	-	-	-	-	-	-	-	-	0.000	4.766
• RDTE 05 PE 0604800M 2262: JSF SDD (STOVL)	64.692	1.710	0.561	-	0.561	0.584	0.596	0.608	0.621	0.000	69.372
• RDTE 05 PE 0604800M 3350: F-35B Sustainment/ Capability Enhancements (STOVL), BPAC 3350	-	-	-	-	-	-	-	-	-	0.000	0.000
• RDTE 05 International 1: International SDD	-	-	-	-	-	-	-	-	-	0.000	0.000

**Remarks**

This is a joint program with no executive service. Service Acquisition Execution (SAE) authority alternates between the Department of the Navy and the Department of the Air Force and currently resides with the Navy.

Program Element 0604800N/0604800M continues USN development efforts budgeted in 0603800N prior to 2002.

The United Kingdom, Italy, Netherlands, Canada, Australia, Denmark, and Norway are participants in the SDD phase of JSF.

Note: The USAF/USN/USMC procurement lines include Aircraft Procurement and Advanced Procurement only. Initial Spares and Repair Parts for all services are reflected in separate lines. International Partner Funding also includes funds provided under the Italy and Netherlands Bilateral agreements.

RELATED RDT&E: Funding prior to JSF SDD (FY94-FY01): USN PE 0603800N \$1,950.617M; USAF PE 0603800F \$1,907.352M; DARPA PE 0603800E \$118.056M; and International Partner contributions of \$253.921M for a total of \$4,229.946M.

**D. Acquisition Strategy**

The SDD program consists of a cost-reimbursement contract awarded to Lockheed Martin Aeronautics Company to develop the F-35 Air System, consisting of three aircraft variants and its associated logistics support system, for the U.S. Services and international participants. Similarly, a cost-reimbursement contract was awarded to Pratt & Whitney to develop the F135 propulsion system. Ground and flight testing will be conducted during development to accomplish validation and verification, with the extensive use of modeling and simulation to offset the risk of this large, complex, and concurrent lifecycle program. A comprehensive logistics support environment, including an integrated training system for aircrew, maintenance, and support personnel, is also being developed.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD	<b>Project (Number/Name)</b> 653831 / Joint Strike Fighter
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On 25 April 2011, the Department of Defense terminated the development of the General Electric Rolls-Royce Fighter Engine Team F136 propulsion system.

The F-35 Program has made international involvement a key element of the acquisition strategy. This includes international partnership in the development, production, and sustainment phases of the lifecycle. Additional international participation includes Foreign Military Sales arrangements.

In Fiscal Year (FY) 2007, separate cost-type contracts were awarded to Lockheed Martin Aeronautics Company and Pratt & Whitney to begin low rate initial production for F-35 air vehicles, propulsion systems, and sustainment for the fielded systems. Transition to fixed-price-type procurement contracts occurred with the fourth low rate lot. To provide logistics support for delivered aircraft, Performance-Based Logistics cost-type contracts will be awarded to Lockheed Martin Aeronautics Company and Pratt & Whitney.

At the completion of Low Rate Initial Production, a Defense Acquisition Board review, and Milestone Decision Authority approval, the F-35 Program will enter Full Rate Production. Fixed-price procurement contracts will be awarded for F-35 air vehicles and propulsion systems for the U.S. Services and international participants. Multiyear procurement authority for the F-35 Air System will be requested for Full Rate Production. Concurrently, multiple-year, fixed-price-type Performance Based Logistics contracts for sustainment will be requested to support multi-Service and multi-national requirements.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD	<b>Project (Number/Name)</b> 653831 / Joint Strike Fighter
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Lockheed Martin - SDD	SS/CPIF	Lockheed Martin : Ft. Worth, TX	32,378.580	94.464	Dec 2018	10.828	Dec 2019	6.234	Dec 2020	-		6.234	3.419	32,493.525	32,495.150
Lockheed Martin - SDD Fee	SS/CPIF	Lockheed Martin : Ft. Worth, TX	1,745.043	9.303	Dec 2018	-		-		-		-	0.000	1,754.346	1,754.193
Prior Year No Longer Funded in FYDP	Various	Various : TBD	12,211.151	-		-		-		-		-	0.000	12,211.151	-
<b>Subtotal</b>			46,334.774	103.767		10.828		6.234		-		6.234	3.419	46,459.022	N/A

**Remarks**  
 Contract type prior to 2013 was CPAF.  
 Cumulative Award Fee earned in prior years for Lockheed Martin is 97%.  
 Cumulative Award Fee earned in prior years for Pratt and Whitney is 98%.

<b>Support (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Support	C/CPAF	Not specified. : TBD	0.000	-		0.000		0.000		0.000		0.000	0.000	0.000	-
AFFTC/Eglin	Various	Various : Various	0.000	-		0.000		0.000		0.000		0.000	0.000	0.000	0.000
Miscellaneous	Various	Various : Various	148.727	22.569	Nov 2018	0.000		0.000		0.000		0.000	0.000	171.296	0.000
NAWC Patuxent River	Various	NAWC AD : Patuxent River, MD	0.000	-		0.000		0.000		0.000		0.000	0.000	0.000	0.000
Prior Year no longer funded in FYDP	Various	Various : Various	1,223.521	-		0.000		0.000		0.000		0.000	0.000	1,223.521	0.000
<b>Subtotal</b>			1,372.248	22.569		0.000		0.000		0.000		0.000	0.000	1,394.817	N/A

<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD	<b>Project (Number/Name)</b> 653831 / Joint Strike Fighter
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<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
NAWC China Lake	Various	NAWC WD : China Lake, CA	43.257	0.000	Nov 2018	-		-		-		-	0.000	43.257	-
Development Test and Evaluation	Various	NAWC AD : Patuxent River, MD	811.512	0.181	Nov 2018	-		-		-		-	0.000	811.693	-
Edwards AFB	Various	Edwards AFB : Edwards AFB, CA	743.319	0.000	Nov 2018	-		-		-		-	0.000	743.319	-
Other (including Classified PIDs)	Various	Various : Various	0.000	-		-		-		-		-	0.000	0.000	-
OT - AFOTEC/AFFTC	Various	OT AFOTEC/ AFFTC : Various	0.000	0.000		-		-		-		-	0.000	0.000	-
OT - JITC/OPTEV	Various	OT JITC/OPTEV : Various	0.000	0.000		-		-		-		-	0.000	0.000	-
OT - Various	Various	Various : Various	16.126	64.432	Nov 2018	-		-		-		-	0.000	80.558	-
Prior Year no longer funded in FYDP	Various	Various : TBD	741.413	-		-		-		-		-	0.000	741.413	-
<b>Subtotal</b>			2,355.627	64.613		-		-		-		-	0.000	2,420.240	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Travel	C/CPAF	Various : Various	27.261	0.511	Dec 2018	-		-		-		-	0.000	27.772	0.000
Prior Year not funded in FYDP	Various	Various : Various	866.338	-		-		-		-		-	0.000	866.338	0.000
<b>Subtotal</b>			893.599	0.511		-		-		-		-	0.000	894.110	N/A

**Remarks**  
Cumulative Award Fee earned in prior years for Stanley is 99%.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD	<b>Project (Number/Name)</b> 653831 / Joint Strike Fighter
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Cost Category Subtotals</b>	50,956.248	191.460	10.828	6.234	0.000	6.234	3.419	51,168.189	N/A
Other Service Funding Adjustment	-	123.461	3.200	0.811	-	0.811			-
<b>Project Cost Totals</b>	50,956.248	67.999	7.628	5.423	0.000	5.423	3.419	51,168.189	-

**Remarks**  
 The project information shown here reflects USN, USMC, USAF and International Partner funding total for each contract. By agreement USN and USMC funding shares are approximately equal and when combined are equal to the USAF share.

NOTE 1: Prior Years reflect \$22,252.708M USAF/\$19,901.107M USN/\$3,808.970M USMC /\$5,013.470M International/Total \$50,976.248M  
 FY 2019 reflects \$ 67.999M USAF/\$ 58.769M USN/\$ 64.692M USMC/\$ 0.000M International/Total \$191.462M  
 FY 2020 reflects \$ 7.628M USAF/\$ 1.490M USN/\$ 1.710M USMC/Total \$10.828M  
 FY 2021 reflects \$ 5.423M USAF/\$ 0.250M USN/\$ 0.561M USMC/Total \$6.234M

JSF EMD Includes:  
 USAF PE 0604800F BPAC 653831  
 USN PE 0604800N Project Unit 2261  
 USMC PE 0604800M Project Unit 2262

D&S Includes:  
 USAF PE 0604800F BPAC 653832  
 USN PE 0604800N Project Unit 3352  
 USMC PE 0604800M Project Unit 3350



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD	<b>Project (Number/Name)</b> 653831 / Joint Strike Fighter
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
<b>JSF Variants - CV, STOVL &amp; CTOL</b>																												
Acquisition Milestones: F-35C Initial Operational Capability		■																										
Test & Evaluation: Test and Evaluation: Initial Operational Test and Evaluation (IOT&E)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY18	■																											
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY19						■																						
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY20											■																	
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY21																												
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 13 Full Funding / Production / Delivery		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 14 Full Funding / Production / Delivery																												
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 15 Full Funding / Production / Delivery																												
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 16 Full Funding / Production / Delivery																												

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD	<b>Project (Number/Name)</b> 653831 / Joint Strike Fighter
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 17 Full Funding / Production / Delivery																																
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 18 Full Funding / Production / Delivery																																
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 19 Full Funding / Production / Delivery																																

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604800F / F-35 - EMD	<b>Project (Number/Name)</b> 653831 / Joint Strike Fighter
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**Schedule Details**

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>JSF Variants - CV, STOVL &amp; CTOL</i></b>				
Acquisition Milestones: F-35C Initial Operational Capability	2	2019	2	2019
Test & Evaluation: Test and Evaluation: Initial Operational Test and Evaluation (IOT&E)	1	2019	4	2020
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY18	1	2019	1	2019
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY19	1	2020	1	2020
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY20	1	2021	1	2021
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY21	1	2022	1	2022
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 13 Full Funding / Production / Delivery	2	2019	1	2020
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 14 Full Funding / Production / Delivery	2	2020	1	2021
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 15 Full Funding / Production / Delivery	2	2021	1	2022
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 16 Full Funding / Production / Delivery	2	2022	4	2023
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 17 Full Funding / Production / Delivery	2	2023	4	2024
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 18 Full Funding / Production / Delivery	2	2024	4	2025
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 19 Full Funding / Production / Delivery	2	2025	4	2025

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Air Force		Date: February 2020
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604800F / F-35 - EMD	Project (Number/Name) 653831 / Joint Strike Fighter

**Note**  
Schedule details reflect fiscal years

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604932F / <i>Long Range Standoff Weapon</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	566.288	646.800	712.539	474.430	0.000	474.430	358.756	395.311	410.198	359.117	616.200	4,539.639
657011: <i>LONG RANGE STAND-OFF</i>	566.288	646.800	712.539	474.430	0.000	474.430	358.756	395.311	410.198	359.117	616.200	4,539.639
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 489

**A. Mission Description and Budget Item Justification**

The Long Range Stand Off (LRSO) Cruise Missile is a long range survivable standoff weapon capable of delivering lethal nuclear effect on strategic targets. LRSO will replace the currently fielded Air Launched Cruise Missile (ALCM) and will be integrated on both legacy and future bomber aircraft. The LRSO weapon system will be capable of penetrating and surviving advanced Integrated Air Defense Systems (IADS) from significant stand-off range to prosecute strategic targets in support of the Air Force's global attack capability and strategic deterrence core function.

Funds may be used to address emerging or short-notice Diminishing Manufacturing and Material Shortage (DMSMS) issues.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Long Range Stand-Off (LRSO) weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F or 0605833F.

This program is conducting activities associated with engineering and manufacturing development tasks aimed at meeting validated requirements during the Technology Maturation and Risk Reduction (TMRR) phase.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 5: <i>System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604932F / <i>Long Range Standoff Weapon</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	664.920	712.539	475.297	0.000	475.297
Current President's Budget	646.800	712.539	474.430	0.000	474.430
Total Adjustments	-18.120	0.000	-0.867	0.000	-0.867
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	5.000	0.000			
• SBIR/STTR Transfer	-23.120	0.000			
• Other Adjustments	0.000	0.000	-0.867	0.000	-0.867

**Change Summary Explanation**

FY19 reduced \$23.120M for Small Business Innovative Research (SBIR) and an addition of \$5M for an internal reprogramming.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Long Range Stand Off (LRSO) Weapon Development</p> <p><b>Description:</b> Conduct LRSO Weapon Development activities</p> <p><b>FY 2020 Plans:</b> Continue Prime Technology Maturation and Risk Reduction (TMRR) contracts to design, develop, integrate and test the LRSO system. The program will continue to evaluate designs to ensure they adequately meet the warfighter's performance requirements in preparation for the interim design review. Robust systems engineering will ensure the USAF owns the technical baseline for requirements traceability as well as reliability, manufacturability, and maintainability.</p> <p><b>FY 2021 Plans:</b> Continue Prime TMRR contracts to design, develop, integrate and test the LRSO system. The program will continue to evaluate designs to ensure they adequately meet the warfighter's performance requirements in preparation for the interim design review. Robust systems engineering will ensure the USAF owns the technical baseline for requirements traceability as well as reliability, manufacturability, and maintainability. Program will begin Engineering and Manufacturing Design (EMD) source selection and Milestone B activities.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 reflects a decrease in funding as both contractors finalize TMRR designs.</p>	577.849	612.147	388.851
<b>Title:</b> All-Up-Round	39.964	42.114	59.771

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604932F / <i>Long Range Standoff Weapon</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> Conduct All-Up-Round activities to support weapon development</p> <p><b>FY 2020 Plans:</b> Continue program practices that ensure the following are met: requirements flow down, requirement allocation to hardware and software, requirements compliance matrix, system performance, reliability, maintainability, product assurance, testability, producibility and supportability. Continue facility and security infrastructure upgrades to enable secure connectivity and communication between Department of Defense (DoD), Department of Energy (DOE), and industry. Continue efforts to conduct parallel development, design, and test activities with the DOE to ensure the LRSO adequately integrates the DOE designed warhead. Conduct initial safety study as part of nuclear certification activities. Continue to perform Aircraft Integration efforts including activities associated with integration on threshold aircraft and aircraft mission planning system upgrades to accommodate the new weapon. Furthermore, these efforts include activities related to weapon design compatibility with both threshold and objective aircraft. Other activities falling under these efforts include: developing mission planning upgrade needs, Operational Flight Program (OFP) development and integration to deliver the OFP test tapes, planning activities necessary to integrate LRSO with aircraft and ensuring the logical, electrical, and physical interfaces of the LRSO as defined in the Initial Capabilities Document (ICD).</p> <p><b>FY 2021 Plans:</b> Continue program practices that ensure the following are met: requirements flow down, requirement allocation to hardware and software, requirements compliance matrix, system performance, reliability, maintainability, product assurance, testability, producibility and supportability. Continue facility and security infrastructure upgrades to enable secure connectivity and communication between Department of Defense (DoD), Department of Energy (DOE), and industry. Continue efforts to conduct parallel development, design, and test activities with the DOE to ensure the LRSO adequately integrates the DOE designed warhead into the system. Conduct safety studies and other nuclear certification activities. Continue to perform Aircraft Integration efforts including activities associated with integration on threshold aircraft and aircraft mission planning system upgrades to accommodate the new weapon. Furthermore, these efforts include activities related to weapon design compatibility and qualification, and other nuclear certification with both threshold and objective aircraft. Other activities falling under these efforts include: developing mission planning upgrade needs, OFP development and integration to deliver the OFP test tapes, planning activities necessary to integrate LRSO with aircraft, and ensuring the logical, electrical, and physical interfaces of the LRSO as defined in the ICD.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 reflects an increase in funding as aircraft integration, warhead integration and mission planning activities ramp-up.</p>				
<b>Title:</b> Test Support		28.987	58.278	25.808

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604932F / <i>Long Range Standoff Weapon</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> Conduct Test Support activities to support weapon development</p> <p><b>FY 2020 Plans:</b> Continue to perform Test Support efforts, including test activities and support for design validation and verification and nuclear certification, as well as system qualification (includes design and operational certification activities). Perform weapon system environment testing. Furthermore, these efforts will continue test planning and execution activities to support LRSO weapon development, All-Up-Round technical integration, and aircraft integration; along with facility and security upgrades to ensure secure infrastructure is in place.</p> <p><b>FY 2021 Plans:</b> Continue to perform design validation, verification, test, nuclear certification (to include design and operational certification) and system qualification activities. Perform weapon system environment testing. Furthermore, these efforts will continue test planning and execution activities to support LRSO weapon development, All-Up-Round technical integration, and aircraft integration.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 reflects a decrease in funding as facility and security upgrades are scheduled to be in place and adequate to support weapon system testing.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	646.800	712.539	474.430

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• MILCON PE 0604932: <i>Long Range Standoff Weapon</i>	-	0.000	0.000	-	0.000	9.628	-	-	-	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**  
The acquisition strategy focuses on the development and integration of subsystem technologies with a robust reliability and manufacturing approach in a competitive environment. The program obtained a successful MS A decision in July 2016 and subsequently released a Request for Proposals. The program competitively selected two prime contractors in August 2017 to execute a 54-month Technology Maturation and Risk Reduction (TMRR) phase. The selected prime contractors will execute Cost-Plus-Fixed-Fee (CPFF) contracts during TMRR with activities focused on developing and maturing subsystem and system designs culminating in a final TMRR design review, delivery of Controlled Test Vehicles and conducting a vehicle configuration audit. A follow-on source selection for Engineering and Manufacturing Development (EMD) and Production phases will be conducted near the end of TMRR to select a single prime contractor to execute the EMD and Production phases of the program.



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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 5				PE 0604932F / Long Range Standoff Weapon				657011 / LONG RANGE STAND-OFF								
<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Long Range Standoff Weapon Development	C/CPPF	Various : TBD	395.232	545.795	Dec 2018	569.108	Dec 2019	340.566	Dec 2020	-		340.566	1,582.003	3,432.704	-	
<b>Subtotal</b>			395.232	545.795		569.108		340.566		-		340.566	1,582.003	3,432.704	N/A	
<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Material Solution Analysis Support	Various	Various : TBD	23.525	-		-		-		-		-	0.000	23.525	-	
Aircraft Integration Planning	Various	Various : TBD	25.914	28.588	Jan 2019	27.797	Jan 2020	47.960	Jan 2021	-		47.960	239.353	369.612	-	
All-Up-Round Activities	Various	Various : TBD	8.661	11.376	Feb 2019	14.317	Feb 2020	11.811	Jan 2021	-		11.811	21.600	67.765	-	
<b>Subtotal</b>			58.100	39.964		42.114		59.771		-		59.771	260.953	460.902	N/A	
<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Test Support	Various	Various : TBD	57.836	28.987	Jan 2019	58.278	Jan 2020	25.808	Jan 2021	-		25.808	150.885	321.794	-	
<b>Subtotal</b>			57.836	28.987		58.278		25.808		-		25.808	150.885	321.794	N/A	
<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Program Management Administration	Various	Various : TBD	55.120	32.054	Oct 2018	43.039	Oct 2019	48.285	Oct 2020	-		48.285	145.741	324.239	-	
<b>Subtotal</b>			55.120	32.054		43.039		48.285		-		48.285	145.741	324.239	N/A	

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Air Force							<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 3600 / 5				<b>R-1 Program Element (Number/Name)</b> PE 0604932F / <i>Long Range Standoff Weapon</i>			<b>Project (Number/Name)</b> 657011 / <i>LONG RANGE STAND-OFF</i>				
	<b>Prior Years</b>	<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	566.288	646.800		712.539		474.430	-	474.430	2,139.582	4,539.639	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604932F / <i>Long Range Standoff Weapon</i>	<b>Project (Number/Name)</b> 657011 / <i>LONG RANGE STAND-OFF</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b><i>Long Range StandOff Weapon</i></b>																												
Technology Maturation and Risk Reduction Phase																												
Milestone B Decision																												
Engineering and Manufacturing Development Phase																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604932F / <i>Long Range Standoff Weapon</i>	<b>Project (Number/Name)</b> 657011 / <i>LONG RANGE STAND-OFF</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Long Range StandOff Weapon</i></b>				
Technology Maturation and Risk Reduction Phase	1	2019	2	2022
Milestone B Decision	2	2022	2	2022
Engineering and Manufacturing Development Phase	2	2022	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604933F / <i>ICBM Fuze Modernization</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	681.902	124.457	161.199	167.099	0.000	167.099	104.657	20.503	2.067	2.105	0.000	1,263.989
655082: <i>ICBM FUZE SUPPORT</i>	681.902	124.457	161.199	167.099	0.000	167.099	104.657	20.503	2.067	2.105	0.000	1,263.989
Quantity of RDT&E Articles	38	8	5	10	-	10	19	8	-	-		

**Program MDAP/MAIS Code:** 0498

**A. Mission Description and Budget Item Justification**

The FY2021 funding request was reduced by \$1.735 million to account for the availability of prior year execution balances.

The Intercontinental Ballistic Missile (ICBM) Fuze Modernization Program is designing and developing a form, fit and functionally equivalent replacement for the Mk21 fuze that will provide a 30-year objective design life. The legacy Mk21 fuze is three times past its design life and ongoing Mk21 fuze refurbishment does not meet Nuclear Weapon Stockpile Plan requirements. The Mk21 reentry vehicle and fuze will be deployed on the current Minuteman III (MM III) and future Ground Based Strategic Deterrent (GBSD) Weapons Systems. Plans to integrate and test the Mk21 replacement fuze with the U.S. Department of Energy (DOE) National Nuclear Security Administration (NNSA) W87-1 warhead are currently under evaluation in the Mk21A program.

The US Air Force (USAF) will develop the Mk21 fuze using the NNSA complex, and the USAF weapons system integration contractor. The NNSA complex consists of Sandia National Labs-California [SNL-CA], Sandia National Labs-New Mexico [SNL-NM] and Kansas City National Security Campus [KCNSC], formerly Kansas City Plant. The ICBM Fuze Modernization program will leverage technologies, parts, components and development/production capabilities resulting from extensive fuze work performed by the US Navy (USN) and NNSA on the Mk5/W88 Alt 370 Fuze program. Common USN & USAF fuze components include the Radar Module, Thermal Battery Assembly and Path Length Module. USN & USAF fuze components that are partially common and use common technologies include the Missile Interface and Controller Module, Launch Safety Device, Firing Set Integration Module and Terminal Protection Device.

The ICBM Fuze Modernization Program will integrate the replacement fuze into MM III weapon system, to include support/test equipment, data, flight test hardware, and training materials. The program will also conduct required system testing (including ground and flight tests). The program is coordinating Mk21 fuze replacement development efforts with the DOE to synchronize USAF arming and fuze development activities with DOE warhead requirements. When prudent, the program will conduct trade studies and initiate conceptual designs to address operational system issues and meet future requirements.

As a cooperative USAF, USN and NNSA acquisition, the USAF is executing the program using Department of Defense (DoD)-DOE Manual 5030.55 Joint Nuclear Weapons Life Cycle Activities (Phase 6.X process) while meeting Major Defense Acquisition Program (MDAP) statutory requirements.

The ICBM Fuze Modernization Program requires a program rebaseline due to capacitor redesign issues and funding limitations in FY19 and FY20. Requirements were deferred until FY21 resulting in a corresponding schedule slip. The funding profile needs for FY22 and beyond will be addressed in future budget submissions.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604933F / ICBM Fuze Modernization
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The FY21 budget request continues cooperative efforts with the USN to leverage common components; conduct final qualification tests; and continue development of lab, ground, and flight test assets. This program also includes any needed nuclear surety and certification and system vulnerability assessments.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver ICBM Fuze Modernization weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F or 0605833F.

This program entered Phase 6.4 "Production Engineering" of the 6.X process Jan 2019. The program will conduct production engineering tasks aimed at meeting validated requirements prior to Phase 6.5.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	167.659	161.199	132.926	0.000	132.926
Current President's Budget	124.457	161.199	167.099	0.000	167.099
Total Adjustments	-43.202	0.000	34.173	0.000	34.173
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-37.000	0.000			
• SBIR/STTR Transfer	-6.202	0.000			
• Other Adjustments	0.000	0.000	34.173	0.000	34.173

**Change Summary Explanation**

FY 2019 funding reflects a Congressionally-approved reprogramming of \$37.000 million and a Small Business Innovation Research transfer of \$6.202 million.  
FY 2021 increase to fully fund ICBM Fuze

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Fuze Design and Development	109.388	123.787	151.999
<b>Description:</b> Design and develop the Mk21 fuze required to support the ICBM W87 warhead. Coordinate design and development efforts with the ICBM weapon system integrator and support flight testing.			
<b>FY 2020 Plans:</b>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604933F / <i>ICBM Fuze Modernization</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>• Continue assessing, testing and qualifying the common components [Radar Module (RM), Path Length Module (PLM), Thermal Battery Assembly (TBA)] with the unique Air Force (AF) environments to ensure compliance to AF requirements</li> <li>• Continue to refine engineering and design work for the AF unique components</li> <li>• Execute and conduct fuze level post test analysis of Flight Test 2</li> <li>• Assess capacitor failures and implement corrective actions</li> <li>• Re-accomplish Final Design Reviews on base metal electrode components requiring electrical board redesign</li> <li>• Accomplish AFA Final Design Review (FDR) and Complete Engineering Release (CER)</li> <li>• Continue Arming and Fuzing Assembly (AFA) Production Process Prove-In</li> <li>• Continue preparations for Joint Test Assembly 4a (JTA4a) developmental flight test</li> <li>• Conduct Ground Test Unit 3 (GTU-3c test activities)</li> </ul> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>• Finish and release JTA4a drawings</li> <li>• Finish and release AFA drawings</li> <li>• Conduct Ground Test Unit 3 (GTU-3b test activities)</li> <li>• Conduct JTA4a High-Fidelity development test</li> <li>• Conduct Process Prove In (PPI) mechanical environmental tests</li> <li>• Conduct PPI thermal environments, cumulative damage, and radiation tests</li> <li>• Continue AFA large and small core material compatibility testing</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased due to capacitor redesign activities that deferred FY20 PPI activities to FY21.</p>				
<p><b>Title:</b> Weapon System Integration/Systems Engineering</p> <p><b>Description:</b> Integrate Mk21 fuze into the MMIII weapon system. Validate designs through ground tests on an Integrated Test Bed (ITB). Plan and conduct necessary ground and flight testing. Coordinate design, development and test efforts.</p> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>• Provide integration support</li> <li>• Perform mass properties analysis to Fuze reentry vehicle integration</li> <li>• Support AFOTEC Flight Test 1 assessment</li> <li>• Support Ground Test Unit 3 (GTU-3c test activities)</li> </ul> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>• Conduct Electrical Compatibility Test 3</li> <li>• Conduct JTA4a Pathfinder Testing</li> </ul>		15.069	37.412	15.100

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604933F / ICBM Fuze Modernization
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> <li>• Continue Basic Nuclear Safety Assessment Report updates</li> <li>• Continue Nuclear Surety Evaluation Report updates</li> <li>• Continue ICBM Compatibility Certification Report updates</li> <li>• Conduct Final Special Safety Study</li> <li>• Validate Technical Order updates</li> <li>• Execute and conduct RV level post test analysis of Flight Test 2</li> <li>• Support Ground Test Unit 3 (GTU-3b test activities)</li> </ul> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b>                      Funding decreased due to reduced development cost as the program prepares to enter production.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	124.457	161.199	167.099

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> Base	<u>FY 2021</u> OCO	<u>FY 2021</u> Total	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• MPAF 03 M30FLH: <i>ICBM FUZE MOD</i>	13.941	19.497	46.908	-	46.908	101.652	114.783	120.971	121.290	276.158	815.200

**Remarks**  
 Other Program Funding Summary reflects Advance Procurement starting FY19, the use of life-of-type equipment buys in FY19, and full funding starting in FY22. This enables the ICBM Fuze Modernization program to continue leveraging the USN design, development and production activities. Life-of-type equipment buys in FY15-18 totaled \$41.778M.

**E. Acquisition Strategy**  
 The ICBM Fuze Modernization program is executing a full cost reimbursable work-for-others agreement with the NNSA complex using SNL as the design agent and KCNSC as the production agent. The program is a collaborative effort with the USN reducing total program cost and development time by leveraging commonality between the ICBM and Submarine Launched Ballistic Missile fuze components. The USN Mk5 Alt 370 fuze is being developed first, with the USAF Mk21 fuze effort following. Both services participate in all design and development efforts to ensure maximum use of common components, subassemblies and technologies. Both services are using NNSA/SNL to perform fuze design and development. The USAF, as lead systems integrator for the Mk21 fuze, competed a separate weapon system integration contract for integration support to assist the government with MM III unique modifications and fuze integration efforts. Both services are using KCNSC to produce fuzes.



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604933F / ICBM Fuze Modernization	<b>Project (Number/Name)</b> 655082 / ICBM FUZE SUPPORT
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Preliminary Design Development	MIPR	Sandia National Labs : Albuquerque, NM	430.462	59.733	Nov 2018	79.729	Nov 2019	71.510	Nov 2020	-		71.510	48.083	689.517	776.264
Fuze EMD	Various	Various : Various	1.746	1.457	Dec 2018	1.025	Nov 2019	2.740	Nov 2020	-		2.740	3.950	10.918	7.362
Fuze Engineering Change Orders	Various	Various : Various	4.175	3.256	May 2019	2.354	May 2020	4.880	May 2021	-		4.880	5.035	19.700	22.364
Fuze National Security Campus (formerly Kansas City Plant)	MIPR	National Security Campus : Kansas City, MO	94.188	38.460	Nov 2018	40.679	Nov 2019	66.380	Nov 2020	-		66.380	35.265	274.972	205.387
Fuze Weapon System Integration - ICBM Prime	C/CPAF	Northrop Grumman : Clearfield, UT	25.937	-		-		-		-		-	0.000	25.937	25.937
Fuze Weapon System Integration - RS/RV Sub-System Contract (SSC)	SS/CPAF	Lockheed Martin : Valley Forge, PA	69.622	15.069	Jan 2019	-		-		-		-	0.000	84.691	89.264
RS/RV Sub-System Contract (SSC)	C/CPFF	Lockheed Martin : Valley Forge, PA	0.000	-		20.840	Jan 2020	15.100	Jan 2021	-		15.100	15.768	51.708	59.140
Fuze Nuclear Safety Cross-Check Analysis (NSCCA)	TBD	TBD : TBD	0.000	-		-		-		-		-	5.945	5.945	7.945
<b>Subtotal</b>			626.130	117.975		144.627		160.610		-		160.610	114.046	1,163.388	N/A

**Remarks**  
 The current Fuze Weapon System Integration - RS/RV Sub-System Contract (SSC) ends in FY19 requiring a new Fuze Weapon System Integration Contract beginning in FY20.  
  
 As the program finalizes the design and begins developmental test item production, funding for Sandia (Fuze Preliminary Design Development) will decrease and funding for Kansas City National Security Campus (Fuze National Security Campus (formerly Kansas City Plant)) will increase.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604933F / ICBM Fuze Modernization	<b>Project (Number/Name)</b> 655082 / ICBM FUZE SUPPORT
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Engineering Support - BAH	C/FP	Booz Allen Hamilton : Clearfield, UT	2.757	-		-		-		-		-	0.000	2.757	2.757
Fuze Engineering Support - BAE	C/FFP	BAE : Clearfield, UT	12.220	1.521	Jul 2019	1.843	Jul 2020	2.000	Jul 2021	-		2.000	5.384	22.968	46.700
<b>Subtotal</b>			14.977	1.521		1.843		2.000		-		2.000	5.384	25.725	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Lead Project Office Support	MIPR	AFNWC : Albuquerque, NM	10.480	-		-		-		-		-	0.000	10.480	10.480
Fuze Finite Element Model Validation	C/CPFF	LMTF : Little Mountain, UT	1.843	-		-		-		-		-	0.000	1.843	1.843
Fuze Flight Test Support and Evaluation	Various	Various : Various	4.538	1.112	Feb 2019	9.429	Feb 2020	-		-		-	0.000	15.079	35.876
<b>Subtotal</b>			16.861	1.112		9.429		-		-		-	0.000	27.402	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Cost and Financial Management	C/FFP	Tecolote : Salt Lake City, UT	5.157	-		-		-		-		-	0.000	5.157	5.157
Fuze FFRDC Support	MIPR	Aerospace : Los Angeles, CA	4.838	1.385	Feb 2019	1.300	Dec 2019	1.300	Nov 2020	-		1.300	5.305	14.128	11.504
Fuze Program Support	C/FFP	BAE : Clearfield, UT	0.993	0.292	Jul 2019	0.979	Jul 2020	-		-		-	0.000	2.264	5.957
Fuze Program Management Administration	Various	Various : Various	12.946	2.172	Mar 2019	3.021	Jul 2020	3.189	Jul 2021	-		3.189	4.597	25.925	26.802
<b>Subtotal</b>			23.934	3.849		5.300		4.489		-		4.489	9.902	47.474	N/A



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604933F / ICBM Fuze Modernization	<b>Project (Number/Name)</b> 655082 / ICBM FUZE SUPPORT
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>AF ICBM Fuze Modernization Program</b>																												
Phase 6.4 Production Engineering																												
Flight Test 1 (Feb 2019)																												
Flight Test 2 (Feb 2020)																												
Final Design Review [FDR] (Aug 2020)																												
Complete Engineering Release (Oct 2020)																												
Flight Test 3 (Aug 2022)																												
Production Readiness Review (Nov 2022)																												
Flight Test 4 (Feb 2024)																												
Phase 6.5 Low Scale Production																												
First Production Unit (May 2024)																												
Required Assets Available (Nov 2024)																												
Phase 6.6 Full Scale Production																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604933F / ICBM Fuze Modernization	<b>Project (Number/Name)</b> 655082 / ICBM FUZE SUPPORT
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>AF ICBM Fuze Modernization Program</b>				
Phase 6.4 Production Engineering	2	2019	3	2024
Flight Test 1 (Feb 2019)	2	2019	2	2019
Flight Test 2 (Feb 2020)	2	2020	2	2020
Final Design Review [FDR] (Aug 2020)	4	2020	4	2020
Complete Engineering Release (Oct 2020)	1	2021	1	2021
Flight Test 3 (Aug 2022)	4	2022	4	2022
Production Readiness Review (Nov 2022)	1	2023	1	2023
Flight Test 4 (Feb 2024)	2	2024	2	2024
Phase 6.5 Low Scale Production	3	2024	4	2025
First Production Unit (May 2024)	3	2024	3	2024
Required Assets Available (Nov 2024)	1	2025	1	2025
Phase 6.6 Full Scale Production	4	2025	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605030F / <i>Joint Tactical Network Center (JTNC)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	2.414	0.000	0.000	0.000	8.340	8.488	8.340	8.494	Continuing	Continuing
655068: <i>Joint Tactical Radio System (JTRS)</i>	-	0.000	2.414	0.000	0.000	0.000	8.340	8.488	8.340	8.494	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The JTNC is responsible for ensuring secure, interoperable, and resilient tactical communications capabilities aligned to modular open architectures in support of Service, Multi-Service, and Coalition forces. The JTNC: (1) maintains a cyber-hardened DoD Information Repository (IR), (2) provides Technical Analyses/Capability Characterizations on tactical communications products, (3) provides Open Systems Architecture Standards, (4) exportability analysis and licensing reviews, and (5) serves as Technical Advisor to the Communications, Command, and Control Leadership Board (C3LB).

This mission is executed in conjunction with other government agencies to include the National Security Agency (NSA), the Joint Interoperability Test Command (JITC), the National Telecommunication and Information Administration (NTIA), the Services, as well as Matrix and Industry partners. Particular attention is paid to ensuring that interagency work is collaborative and eliminates duplicative capability. The JTNC enables a common software baseline that is hardware agnostic leading to increased competition for Software Defined Radios (SDR).

Through collaboration with DoD Matrix and Industry partners the JTNC supports continued development/maturation of the DoD Waveform IR, analysis of directed software and artifacts, support of the National Security Agency (NSA) Commercial Communications Security (COMSEC) Evaluation Program (CCEP), JTNC Standards Interface Control Working Group (ICWG), the Capabilities Characterization and Tactical Communications Marketplace (CC & TCM), and Modular Radio Architecture (MRA).

JTNC is funded using a Joint budget strategy. Each Military Department (MILDEP) budgets for approximately one-third of the total program RDT&E requirements for joint efforts. Fiscal Year (FY) 2019 to FY 2020 funding balances represent the post-RMD consolidated funding from the other Services, while FY 2021 and beyond reflects the Air Force one-third portion of total program RDT&E funds.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver ensuring secure, interoperable, and resilient tactical communications capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605030F / <i>Joint Tactical Network Center (JTNC)</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	2.414	8.182	0.000	8.182
Current President's Budget	0.000	2.414	0.000	0.000	0.000
Total Adjustments	0.000	0.000	-8.182	0.000	-8.182
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-8.182	0.000	-8.182

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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<b>Title:</b> Joint Tactical Networking Center (JTNC)	0.000	2.414	0.000
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**Description:** The Joint Tactical Networking Center (JTNC) is responsible for ensuring secure, interoperable, and resilient tactical communications capabilities aligned to modular open architectures in support of Service, Multi-Service, and Coalition forces. The JTNC: (1) maintains a cyber-hardened DoD Information Repository (IR), (2) provides Technical Analyses/Capability Characterizations on tactical communications products, (3) provides Open Systems Architecture Standards, (4) exportability analysis and licensing reviews, and (5) serves as Technical Advisor to the Communications, Command, and Control Leadership Board (C3LB).

**FY 2020 Plans:**

- Continue analysis of C3LB approved waveforms in accordance Service priorities and the FY20 JTNC Management Plan.
- Continue collecting relevant software, technical documentation, cataloging and inducting other DoD and Commercial Communication Waveforms listed in the DoD Communication Waveform Inventory.
- Continue to enhance DoD Information Repository capability and approved Standards promulgation.
- Continue the development of the tactical communications vendor product capability characterization process for commercial off-the-shelf (COTS) and non-developmental item (NDI) tactical communication products.
- Continue to evolve DoD Waveform Standards to facilitate common development, interoperability and re-use, reducing product development time and facilitating faster delivery of capabilities to warfighters.
- Continue to conduct technical waveform and software artifact analyses against published standards.
- Continue to support export requests and analyses of products for exportability.

	0.000	2.414	0.000
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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605030F <i>I Joint Tactical Network Center (JTNC)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
<p>- Continue to certify secure, reusable software waveforms based on government controlled open architecture to encourage a competitive, cost effective, interoperable networking environment.</p> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>- Will continue analysis of C3LB approved waveforms in accordance Service priorities and the proposed FY21 JTNC Management Plan.</li> <li>- Will continue collecting relevant software, technical documentation, cataloging and inducting other DoD and Commercial Communication Waveforms listed in the DoD Communication Waveform Inventory.</li> <li>- Will continue to enhance DoD Information Repository capability and approved Standards promulgation.</li> <li>- Will continue the development of the tactical communications vendor product capability characterization process for commercial off-the-shelf (COTS) and non-developmental item (NDI) tactical communication products.</li> <li>- Will continue to evolve DoD Waveform Standards to facilitate common development, interoperability and re-use, reducing product development time and facilitating faster delivery of capabilities to warfighters.</li> <li>- Will continue to conduct technical waveform and software artifact analyses against published standards.</li> <li>- Will continue to support export requests and analyses of products for exportability.</li> <li>- Will continue to certify secure, reusable software waveforms based on government controlled open architecture to encourage a competitive, cost effective, interoperable networking environment.</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase of \$5.765 between FY20 and FY21 is due to funding allocation in the out years to cover the 1/3 share of JTNC funding which is reprogrammed to Army PE 0605030A via RMD in the year of execution, as per the JTNC Tri Military Department Resource Plan signed by the Services.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	2.414	0.000

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**  
The Joint Tactical Networking Center is funded by all the Services. The Joint Funding Strategy requires each of the three Service Military Departments (MILDEPs) to budget for one-third of the total program approved requirement. Army funding in FY21 and beyond reflects only approximately one-third of total funding. Other funding is as follows (PB20 locked positions):

Navy RDTE: 0605030N, 3077. FY21 = 4,644 // FY22 = 4,741 // FY23 = 4,835 // FY24 = 4,932 // FY25 = 5,031  
 Army RDTE: 0605030A, 655030. FY21 = 5,833 // FY22 = 5,835 // FY23 = 5,490 // FY24 = 5,847 // FY25 = 5,952

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605030F / <i>Joint Tactical Network Center (JTNC)</i>
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**D. Other Program Funding Summary (\$ in Millions)**

Due to Joint Funding Strategy, there is no prior year funding for JTNC in the other Service lines. Prior to the year of execution, the JTNC funding is consolidated in Army PE 0605030A for execution. In accordance with the Joint Tactical Networking Center Charter updated and re-validated on 29 March 2016, the JTNC will remain under a Joint Budget Strategy funded by the three MILDEPs.

**E. Acquisition Strategy**

Joint Tactical Networking Center is classified as a Joint Support Program to Acquisition, Technology & Logistics (AT&L), DoD Chief Information Officer (CIO), and the Services. JTNC core functions as defined in the JTNC Acquisition Decision Memorandum and Charter signed on 20 January 2014, revalidated on 29 March 2016 and 13 September 2019 include: Department of Defense (DoD) Information Repository (IR) management and configuration control, DoD Waveform Standards and Software Communications Architecture (SCA), technical analyses of Government Program of Record (POR) and Industry COTS and NDI Waveform products. The services derived from these core functions reinforce an acquisition environment which ensures that interoperable, secure, and affordable joint tactical waveforms and wireless communications applications can operate in a variety of hardware transport solutions.

The FY21 Budget supports continued development/maturation of the DoD Waveform IR, analysis of directed software and artifacts, support of the National Security Agency (NSA) Commercial Communications Security (COMSEC) Evaluation Program (CCEP), JTNC Standards Interface Control Working Group (ICWG), the Capabilities Characterization and Tactical Communications Marketplace (CC & TCM). The FY21 budget supports the Lead Services initiative where JTNC will serve as a technical advisor and source of engineering and analytic resources in the conduct of Joint enterprise-level systems engineering and analysis and support DoD CIO. The FY21 budget supports Modular Radio Architecture (MRA) where JTNC will lead development and promulgation of a framework containing a collection of DoD standards and a description or architecture of how to use these to compose or control a communications system. The MRA defines how to implement a communications system or radio on select platforms.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605030F / <i>Joint Tactical Network Center (JTNC)</i>	<b>Project (Number/Name)</b> 655068 / <i>Joint Tactical Radio System (JTRS)</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>JTNC - Compliance and Certification</b>	
Waveform and Wireless Product Compliance and Certification	
<b>JTNC - Information Repository</b>	
DoD Waveform Information Repository	
<b>JTNC - Standards</b>	
Evolve Waveform Standards and SCA	
<b>JTNC - Analysis</b>	
Analyze Waveforms and Associated Artifacts	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605030F / <i>Joint Tactical Network Center (JTNC)</i>	<b>Project (Number/Name)</b> 655068 / <i>Joint Tactical Radio System (JTRS)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>JTNC - Compliance and Certification</i></b>				
Waveform and Wireless Product Compliance and Certification	1	2020	4	2025
<b><i>JTNC - Information Repository</i></b>				
DoD Waveform Information Repository	1	2020	4	2025
<b><i>JTNC - Standards</i></b>				
Evolve Waveform Standards and SCA	1	2020	4	2025
<b><i>JTNC - Analysis</i></b>				
Analyze Waveforms and Associated Artifacts	1	2020	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605056F / <i>Open Architecture Management</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	30.000	30.547	0.000	30.547	31.165	31.781	32.412	33.520	Continuing	Continuing
656060: <i>Standards Management</i>	-	0.000	30.000	30.547	0.000	30.547	31.165	31.781	32.412	33.520	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Open Architecture Management Office (OAMO) at the Air Force Life Cycle Management Center is responsible for developing, evolving, and managing open standards. Open standards permit Department of Defense programs to reduce acquisition and life-cycle costs as well as the risks associated with development, sustainment, technology refresh, and capability upgrades of mission systems on weapon systems. The first standards the office is managing are the Open Mission Systems (OMS) Standard and the Universal Command and Control (C2) Interface (UCI) Standard.

OAMO provides funding to multiple entities, including the Air Force Research Laboratory (AFRL), the 76th Software Maintenance Group (76 SMXG), defense contractors, Federally Funded Research and Development Centers (FFRDCs), and University Affiliated Research Centers in support of standards management activities. AFRL is responsible for executing science and technology initiatives to further develop OMS/UCI standards. The 76 SMXG is responsible for key activities and deliverables for the OMS and UCI standards including: managing a collaboration tools environment, updating tools in the OMS/UCI Starter Kit, updating the Government critical abstraction layer, maintaining the Reference Implementation, integrating and testing the Mission Package, completing Change Package Development and Sponsorship, supporting the OMS and UCI management activities, providing support to adopting programs, and providing training and associated documentation.

Current Preplanned Product Improvements (P3I) include the development, test, and implementation of additional cybersecurity measures or other Standards initiatives including specifically targeted improvements to the standards, coordination with other standardization efforts, additional and more thorough training activities, and widening the applicability of the OMS/UCI standard. The OAMO will execute P3I initiatives as required.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver open standards capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

The Open Architecture Management Program Element was newly established in FY 2020. The entirety of Open Architecture Management activities transferred from a classified Air Force RDT&E Program Element to unclassified PE 0605056F, Open Architecture Management, in order to increase Congressional transparency.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605056F / <i>Open Architecture Management</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	30.000	25.000	0.000	25.000
Current President's Budget	0.000	30.000	30.547	0.000	30.547
Total Adjustments	0.000	0.000	5.547	0.000	5.547
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	5.547	0.000	5.547

**Change Summary Explanation**

Increase in FY 2021 of \$5.547 million is to complete the remaining transfer of previously classified open architecture management activities to the Open Architecture Management PE 0605056F.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Open Architecture Management Office	0.000	30.000	30.547
<b>Description:</b> Accomplish all industry activities that result in the annual release of the Open Mission Systems / Universal Command and Control Interface (OMS/UCI) Standards along with the associated documentation, including training materials. Manage government activities to support the OMS and UCI Standards. Conduct other preplanned activities to add additional capability and evolve the standards.			
<b>FY 2020 Plans:</b> Modify and update the existing OMS and UCI standards to widen the pool of OMS/UCI applicability, account for emerging technologies, adjust for program specific needs, and conduct targeted training. In coordination with industry partners develop annual releases of the OMS/UCI standards, develop training and implementation materials, and conduct quarterly common governance boards. Provide government expertise to support standards development efforts. Work transition activities for other standards, as required. Develop an annual starter kit, update tool kits, perform testing and integration activities, assist in the generation of an Anti-Tamper (AT) interface control document, and conduct other management and development activities. Ensure development of the standard incorporates cybersecurity considerations. Conduct other Preplanned Product Improvements P3I initiatives, such as specifically targeted improvements to the standards, and coordination with other standardization efforts.			
<b>FY 2021 Plans:</b>			



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605056F / <i>Open Architecture Management</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Continue to modify and update the existing OMS and UCI standards to widen the pool of OMS/UCI applicability, account for emerging technologies, adjust for program specific needs, and conduct targeted training. In coordination with industry partners develop annual releases of the OMS/UCI standards, develop training and implementation materials, and conduct quarterly common governance boards. Provide government expertise to support standards development efforts. Continue working transition activities for other standards, as required. Develop an annual starter kit, update tool kits, perform testing and integration activities, assist in the generation and modification of an Anti-Tamper (AT) interface control document, and conduct other management and development activities. Ensure development of the standard incorporates cybersecurity considerations including message/data transfer security, cyber risk mitigation, and implementation standardization. Conduct other P3I initiatives, such as specifically targeted improvements to the standards, and coordination with other standardization efforts.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b>  FY 2021 increase compared to FY 2020 by \$0.547 million. Funding increased due to Department of Defense inflationary factors and the transfer of remaining open architecture management activities and funding from previous classified PE.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	30.000	30.547

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**  
In FY 2019 and prior, this work was being performed in a classified Air Force RDT&E PE. Additional details can be provided in an appropriate forum.

**E. Acquisition Strategy**  
The Air Force Life Cycle Management Center's OAMO awarded a follow-on contract to continue the standards management activities conducted under a previously classified Air Force RDT&E Program Element. The contract is a cost plus fixed fee (CPFF) indefinite delivery/indefinite quantity (ID/IQ) that was awarded in December 2018. The first delivery order has a period of performance of 3 years beginning 1 January 2019.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605056F / <i>Open Architecture Management</i>	<b>Project (Number/Name)</b> 656060 / <i>Standards Management</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Open Architecture Collaborative Working Group - BAE Systems	SS/CPFF	BAE Systems : Nashua, NH	-	0.000		1.144	Jan 2020	1.168	Dec 2020	-		1.168	Continuing	Continuing	-
Open Architecture Collaborative Working Group - Boeing	SS/CPFF	Boeing : St. Louis, MO	-	0.000		4.145	Jan 2020	4.299	Dec 2020	-		4.299	Continuing	Continuing	-
Open Architecture Collaborative Working Group - General Atomics ASI	SS/CPFF	General Atomics ASI : Poway, CA	-	0.000		1.088	Jan 2020	1.112	Dec 2020	-		1.112	Continuing	Continuing	-
Open Architecture Collaborative Working Group - Collins Aerospace	SS/CPFF	Collins Aerospace : Westford, MA	-	0.000		1.204	Jan 2020	1.107	Dec 2020	-		1.107	Continuing	Continuing	-
Open Architecture Collaborative Working Group - Harris Corp	SS/CPFF	Harris Corp : Clifton, NJ	-	0.000		1.274	Jan 2020	1.291	Dec 2020	-		1.291	Continuing	Continuing	-
Open Architecture Collaborative Working Group - Lockheed Martin	SS/CPFF	Lockheed Martin : Fort Worth, TX	-	0.000		6.906	Jan 2020	6.890	Dec 2020	-		6.890	Continuing	Continuing	-
Open Architecture Collaborative Working Group - Northrop Grumman	SS/CPFF	Northrop Grumman : Melbourne, FL	-	0.000		5.082	Jan 2020	5.391	Dec 2020	-		5.391	Continuing	Continuing	-
Open Architecture Collaborative Working Group - Raytheon	SS/CPFF	Raytheon : El Segundo, CA	-	0.000		1.923	Jan 2020	1.967	Dec 2020	-		1.967	Continuing	Continuing	-
Air Force Research Laboratory (AFRL) Science and Technology Initiatives	MIPR	AFRL : Various	-	0.000		2.237	Jan 2020	2.363	Dec 2020	-		2.363	Continuing	Continuing	-
76th Software Maintenance Group (76 SMXG) Development	PO	76 SWEG : Tinker AFB, OK	-	0.000		4.013	Jan 2020	4.134	Dec 2020	-		4.134	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605056F / <i>Open Architecture Management</i>	<b>Project (Number/Name)</b> 656060 / <i>Standards Management</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering Support (1)	MIPR	EPAS Contract : TBD	-	0.000		0.371	Jan 2020	0.334	Dec 2020	-		0.334	Continuing	Continuing	-
Engineering Support (2)	MIPR	P3I : TBD	-	0.000		0.337	Jan 2020	0.342	Dec 2020	-		0.342	Continuing	Continuing	-
Engineering Support (3)	MIPR	MIT-LL : TBD	-	0.000		0.064	Jan 2020	0.064	Dec 2020	-		0.064	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		29.788		30.462		-		30.462	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration	Various	OAM Program Office : Wright-Patterson AFB, OH	-	0.000		0.212	Jan 2020	0.085	Dec 2020	-		0.085	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		0.212		0.085		-		0.085	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	0.000	30.000	30.547	-	30.547	Continuing	Continuing	N/A

**Remarks**  
 In FY 2019 and prior, this work was performed in a classified Air Force RDT&E PE.  
 Additional details can be provided in appropriate forum.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605056F / <i>Open Architecture Management</i>	<b>Project (Number/Name)</b> 656060 / <i>Standards Management</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Develop and Evolve Standards</i></b>	
Quarterly Governance Boards	
FY 2020 Annual Release of Open Mission System and Universal Command and Control Interface (OMS/UCI) Standards	
FY 2021 Annual Release of OMS/UCI Standards	
FY 2022 Annual Release of OMS/UCI Standards	
FY 2023 Annual Release of OMS/UCI Standards	
FY 2024 Annual Release of OMS/UCI Standards	
FY 2025 Annual Release of OMS/UCI Standards	
FY 2020 Annual Integration Event	
FY 2021 Annual Integration Event	
FY 2022 Annual Integration Event	
FY 2023 Annual Integration Event	
FY 2024 Annual Integration Event	
FY 2025 Annual Integration Event	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605056F / <i>Open Architecture Management</i>	<b>Project (Number/Name)</b> 656060 / <i>Standards Management</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Develop and Evolve Standards</i></b>				
Quarterly Governance Boards	1	2020	4	2025
FY 2020 Annual Release of Open Mission System and Universal Command and Control Interface (OMS/UCI) Standards	1	2020	1	2020
FY 2021 Annual Release of OMS/UCI Standards	1	2021	1	2021
FY 2022 Annual Release of OMS/UCI Standards	1	2022	1	2022
FY 2023 Annual Release of OMS/UCI Standards	1	2023	1	2023
FY 2024 Annual Release of OMS/UCI Standards	1	2024	1	2024
FY 2025 Annual Release of OMS/UCI Standards	1	2025	1	2025
FY 2020 Annual Integration Event	2	2020	4	2020
FY 2021 Annual Integration Event	2	2021	4	2021
FY 2022 Annual Integration Event	2	2022	4	2022
FY 2023 Annual Integration Event	2	2023	4	2023
FY 2024 Annual Integration Event	2	2024	4	2024
FY 2025 Annual Integration Event	2	2025	4	2025

**Note**

In FY 2019 and prior, this work was performed in a classified Air Force RDT&E PE.

Additional details can be provided in appropriate forum.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	5,566.234	77.852	59.561	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5,703.647
651120: <i>Pegasus Capability Improvements</i>	0.000	0.000	13.868	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.868
655271: <i>KC-46 RDT&amp;E</i>	5,566.234	77.852	45.693	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5,689.779

**Program MDAP/MAIS Code:** 387

**A. Mission Description and Budget Item Justification**

Replacement of the legacy tanker fleet will take place in several stages. The initial tanker replacement increment of KC-46s will replace roughly a third of the current capability. Future programs will ultimately recapitalize the entire tanker fleet over a period of more than 30 years. The Air Force completed an Analysis of Alternatives (AoA) in Apr 2006 to determine the most appropriate strategy to recapitalize the aging fleet of aerial refueling aircraft. Based on this analysis, the Air Force concluded a strategy of full and open competition to select a commercial derivative replacement tanker aircraft would result in a best value tanker contract. To initiate the first phase of the tanker replacement, the KC-46 program released a final Request for Proposal (RFP) on 24 Feb 2010, and entered source selection on 9 Jul 2010. The KC-46 program held a Milestone B (MS B) Defense Acquisition Board (DAB) on 23 Feb 2011, received approval to enter Engineering and Manufacturing Development (EMD) from the Undersecretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)) on 24 Feb 2011, and awarded the KC-46 EMD contract to Boeing on 24 Feb 2011 to develop and procure 179 KC-46 aircraft. The program is procuring four RDT&E aircraft for integration and demonstration of capability which will ultimately be operationally fielded. During production, the program plans to procure 175 aircraft throughout 13 lots. The KC-46 program held a MS C DAB on 12 Aug 2016 and received approval to enter Low Rate Initial Production (LRIP). The program awarded LRIP Lots 1 and 2 on 18 Aug 2016, LRIP Lot 3 on 27 Jan 2017, LRIP Lot 4 on 10 Sep 2018, and LRIP Lot 5 on 27 Sep 2019. Lot 6 award is planned for May 2020 totaling 79 aircraft to date. The Air Force delivered the first KC-46 to McConnell Air Force Base on 25 Jan 2019. As of 10 Jan 2020, 30 aircraft have been delivered to the Air Force. KC-46 funding also supports Training Systems, Direct Mission Support, Program Management Administration (PMA) activities, government developmental and operational test support, mission planning capability development, various studies and analyses, KC-46 requirements definition and demonstrations in support of Air Force Advanced Battle Management System (ABMS) initiative, engineering changes, and future tanker replacement planning activities.

The KC-46 will provide the capability to fuel joint and coalition receivers via a boom or drogue system on every mission and will also augment the airlift fleet with cargo, passenger, and aeromedical evacuation capabilities. The KC-46 will operate in day/night and adverse weather conditions to enable deployment, employment, sustainment, and redeployment of U.S. joint, allied, and coalition forces. The KC-46 will have communication, navigation, and surveillance equipment for worldwide operations; the capability to perform missions in chemical and biological environments; the ability to operate in up to medium threat environments with self-defense/protection (both active and passive) capabilities; and the necessary battlespace awareness to mitigate survivability threats.

The Aircrew Training System (ATS) and the Maintenance Training System (MTS) are being developed and procured using KC-46 funding. The ATS contract was awarded on 1 May 2013 to FlightSafety Services Corporation. The ATS contract will provide Aircrew Training Devices (ATDs), to include Weapon System Trainers (WSTs), Boom Operator Trainers (BOTs), Fuselage Trainers (FuTs), and Part-Task Trainers (PTTs) at each Main Operating Base (MOB) and the Formal Training Unit

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 5: <i>System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46
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(FTU). The ATS contract will also support Distributed Mission Operations (DMO), provide aircrew instruction, develop courseware, provide logistics support, acquire a technical data package to support future competition efforts, and manage training device concurrency with the aircraft.

The MTS contract was awarded 6 Jul 2016 to The Boeing Company. The MTS acquisition focuses on designing, developing, testing, producing, and fielding an optimized training system for KC-46 maintainers by integrating various forms of training media and Maintenance Training Devices (MTDs) into a "blended" solution. This blended solution includes the appropriate mix of hardware and software, "high-fidelity" Augmented Hardware Training Devices (AHTDs), PTTs, Interactive Multimedia Instruction (IMI), and emerging technologies to meet validated Air Mobility Command (AMC) maintenance training requirements.

In FY2021, PE 0605221F KC-46, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements efforts were transferred to PE 401221F, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements in order to consolidate all KC-46 activity under a single PE. PE 0401221F also has historical Tanker Replacement costs from FY 2005-2008.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver KC-46 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	80.170	59.561	78.948	0.000	78.948
Current President's Budget	77.852	59.561	0.000	0.000	0.000
Total Adjustments	-2.318	0.000	-78.948	0.000	-78.948
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-2.318	0.000			
• Other Adjustments	0.000	0.000	-78.948	0.000	-78.948

**Change Summary Explanation**

FY 2019 was reduced by \$2.318M for Small Business Innovation Research (SBIR).  
 FY 2021 funding transferred to PE 0401221F.



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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46	<b>Project (Number/Name)</b> 651120 / Pegasus Capability Improvements
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
651120: <i>Pegasus Capability Improvements</i>	0.000	0.000	13.868	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.868
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The KC-46 will provide the capability to fuel joint and coalition receivers via a boom or drogue system on every mission and will also augment the airlift fleet with cargo, passenger, and aeromedical evacuation capabilities. The KC-46 will operate in day/night and adverse weather conditions to enable deployment, employment, sustainment, and redeployment of U.S. joint, allied, and coalition forces. The KC-46 will have communication, navigation, and surveillance equipment for worldwide operations; the capability to perform missions in chemical and biological environments; the ability to operate in up to medium threat environments with self-defense/protection (both active and passive) capabilities; and the necessary battlespace awareness to mitigate survivability threats.

The dynamics and mission urgency of the post-production (post-DD-250) environment requires the program to maintain a flexible and responsive posture to support a broad range of mission support needs. The KC-46 will continue to identify, design, develop, integrate, verify, certify, produce, install, field, and sustain a comprehensive range of non-recurring and recurring post-production, air vehicle enhancements and field support needs. These needs may originate from programmed Mobility Air Force (MAF) requirements, Combatant Commander Joint or Urgent Operational Needs (JUON/UON), non-programmed Federal Aviation Administration (FAA) directives, requirements identified and supported by Higher Headquarters (HHQ) Enterprise Capability Collaboration Teams (i.e., High Value Airborne Asset [HVAA], Air Superiority 2030, and Multi-Domain Command and Control [MDC2]), or correction of field deficiencies.

The KC-46 will continue to develop, field, and sustain warfighter capabilities to meet evolving threats and mission support requirements through Block or discrete modification or modernization programs depending on mission urgency, available funding, and programmatic and technical risks. Post-production requirements can include, but will not be limited to: avionics and structural systems/ architecture and subsystem updates, general mission equipment updates and procurement, general sustainment support, studies and analyses, future Tanker requirements simulation and training, and correction of field deficiencies.

BPAC 651120 funding will also support Program Management Administration (PMA) activities, test support, mission planning capability development and various studies and analyses.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver KC-46 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> KC-46A Block 1 Pegasus Advanced Communications Suite (PACS)	-	13.868	0.000
<b>Description:</b> The KC-46A Block 1 Pegasus Advanced Communications Suite (PACS) program will satisfy Department of Defense (DoD), National Security Agency (NSA), Department of Transportation (DoT), and USAF mandates by upgrading legacy Tactical			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46	<b>Project (Number/Name)</b> 651120 / Pegasus Capability Improvements

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Data Link 16, Beyond Line-of-Sight (BLOS) Ultra High Frequency (UHF) Line-of-Sight (LOS) capabilities with next-generation Link 16 terminals and UHF secure, global, BLOS and anti-jam LOS satellite voice communications capabilities for the KC-46 weapon system. PACS enables compatibility and interoperability with current and planned future joint and allied forces while simultaneously increasing the survivability of secure global voice and data communications capabilities between Mobility Air Force (MAF) Command and Control (C2) agencies and MAF aircraft operating worldwide in or near contested environments.			
<b>FY 2020 Plans:</b> Funding moved to Project 655271 to support KC-46 baseline efforts.			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred to PE 0401221F in FY2021.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	13.868	0.000

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 KC046A: KC-46A MDAP	8.547	5.213	-	-	-	-	-	-	-	-	Continuing Continuing

**Remarks**

**D. Acquisition Strategy**

The KC-46 Post-Production Change Management (PPCM) construct is comprised of processes and tools specifically tailored to a broad spectrum of post-production requirements to support the KC-46 enterprise (e.g. weapon system, sustainability, training devices). PPCM is designed to leverage competition when applicable and emphasize configuration management and discrete cost accounting methodologies. KC-46 PPCM oversight will promote competition throughout the life cycle of the KC-46A fleet. All KC-46 post-production requirements and associated acquisition strategies will be carefully managed, reviewed, and approved at the appropriate levels by the KC-46 Division and/or Tanker Directorate senior functional leaders. PPCM requirements will employ multiple contract-types, tailored to the requirement and documented in discrete Acquisition Strategy Panel briefings, to minimize cost, technical, and schedule execution risks and ensure on-time deliverables. In addition, all ACAT-level programs, deriving from the PPCM process, will follow Department of Defense (DoD) Directive 5000.01 and DoD Instruction 5000.02 guidelines and directives, as applicable, to ensure management controls--commensurate with the scope and cost of the supported requirement.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46	<b>Project (Number/Name)</b> 651120 / Pegasus Capability Improvements	

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

**KC-46A Block I PACS**

Project Planning prior to award in FY21 with funding in new PE 0401221F



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46	<b>Project (Number/Name)</b> 651120 / Pegasus Capability Improvements

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>KC-46A Block I PACS</b>				
Project Planning prior to award in FY21 with funding in new PE 0401221F	1	2020	4	2020

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46				<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
655271: KC-46 RDT&E	5,566.234	77.852	45.693	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5,689.779
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

Replacement of the legacy tanker fleet will take place in several stages. The initial tanker replacement increment of KC-46s will replace roughly a third of the current capability. Future programs will ultimately recapitalize the entire tanker fleet over a period of more than 30 years. The Air Force completed an Analysis of Alternatives (AoA) in Apr 2006 to determine the most appropriate strategy to recapitalize the aging fleet of aerial refueling aircraft. Based on this analysis, the Air Force concluded a strategy of full and open competition to select a commercial derivative replacement tanker aircraft would result in a best value tanker contract. To initiate the first phase of the tanker replacement, the KC-46 program released a final Request for Proposal (RFP) on 24 Feb 2010, and entered source selection on 9 Jul 2010. The KC-46 program held a Milestone B (MS B) Defense Acquisition Board (DAB) on 23 Feb 2011, received approval to enter Engineering and Manufacturing Development (EMD) from the Undersecretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)) on 24 Feb 2011, and awarded the KC-46 EMD contract to Boeing on 24 Feb 2011 to develop and procure 179 KC-46 aircraft. The program is procuring four RDT&E aircraft for integration and demonstration of capability which will ultimately be operationally fielded. During production, the program plans to procure 175 aircraft throughout 13 lots. The KC-46 program held a MS C DAB on 12 Aug 2016 and received approval to enter Low Rate Initial Production (LRIP). The program awarded LRIP Lots 1 and 2 on 18 Aug 2016, LRIP Lot 3 on 27 Jan 2017, LRIP Lot 4 on 10 Sep 2018, and LRIP Lot 5 on 27 Sep 2019. Lot 6 award is planned for May 2020, and will bring the total number of aircraft on contract to 79. The Air Force delivered the first KC-46 to McConnell Air Force Base on 25 Jan 2019. As of 10 Jan 2020, 30 aircraft have been delivered to the Air Force. KC-46 funding also supports Training Systems, Direct Mission Support, Program Management Administration (PMA) activities, government developmental and operational test support, mission planning capability development, various studies and analyses, engineering changes, and future tanker replacement planning activities.

The KC-46 will provide the capability to fuel joint and coalition receivers via a boom or drogue system on every mission and will also augment the airlift fleet with cargo, passenger, and aeromedical evacuation capabilities. The KC-46 will operate in day/night and adverse weather conditions to enable deployment, employment, sustainment, and redeployment of U.S. joint, allied, and coalition forces. The KC-46 will have communication, navigation, and surveillance equipment for worldwide operations; the capability to perform missions in chemical and biological environments; the ability to operate in up to medium threat environments with self-defense/protection (both active and passive) capabilities; and the necessary battlespace awareness to mitigate survivability threats.

The Aircrew Training System (ATS) and the Maintenance Training System (MTS) are being developed and procured using KC-46 funding. The ATS contract was awarded on 1 May 2013 to FlightSafety Services Corporation. The ATS contract will provide Aircrew Training Devices (ATDs), to include Weapon System Trainers (WSTs), Boom Operator Trainers (BOTs), Fuselage Trainers (FuTs), and Part-Task Trainers (PTTs) at each Main Operating Base (MOB) and the Formal Training Unit (FTU). The ATS contract will also support Distributed Mission Operations (DMO), provide aircrew instruction, develop courseware, provide logistics support, acquire a technical data package to support future competition efforts, and manage training device concurrency with the aircraft.

The MTS contract was awarded 6 Jul 2016 to The Boeing Company. The MTS acquisition focuses on designing, developing, testing, producing, and fielding an optimized training system for KC-46 maintainers by integrating various forms of training media and Maintenance Training Devices (MTDs) into a "blended" solution. This

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46	<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E
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blended solution includes the appropriate mix of hardware and software, "high-fidelity" Augmented Hardware Training Devices (AHTDs), PTTs, Interactive Multimedia Instruction (IMI), and emerging technologies to meet validated Air Mobility Command (AMC) maintenance training requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver KC-46 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> KC-46 Aircraft Product Development</p> <p><b>Description:</b> EMD activities will be conducted to include the following types of activities: develop a commercial 767-2C aircraft upon which the KC-46 is based; develop the KC-46 military capability and integrate it into the aircraft; build four EMD aircraft; procure live fire assets; procure required Government Furnished Equipment (GFE); procure simulator and maintenance data; develop technical manuals and Type 1 training; and conduct development and operational testing.</p> <p><b>FY 2020 Plans:</b> Continue product refinement, studies, ground, and flight testing in support of the KC-46 weapon system to include receiver certifications, simulator data collection, and completion of IOT&amp;E events/reporting. Continue execution of boom telescope actuator redesign (BTAR) Engineering Change Proposal (ECP) and support other government costs associated with solution for Remote Vision System (RVS). Study, analyze, test and update documentation in order to certify and increase KC-46 capability for aerial refueling onload.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred to PE 0401221F in FY2021.</p>	31.918	30.054	0.000
<p><b>Title:</b> KC-46 Trainer Product Development - Maintenance Training System (MTS)</p> <p><b>Description:</b> Trainer development activities will be conducted to include the following types of activities: development and procurement of MTDs, courseware, and associated support equipment.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> N/A</p>	0.327	0.000	0.000
<p><b>Title:</b> KC-46 Support</p> <p><b>Description:</b> Development, integration, and demonstration of the KC-46 mission planning capability. In addition, studies and analysis to support planning activities for future efficiency initiatives, business case analyses, future tanker replacement planning,</p>	7.182	4.799	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46	<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
and miscellaneous Program Office support and planning. Also includes requirements such as travel, office supplies, training courses, and service contracts.  <b>FY 2020 Plans:</b> Continue Program Office Support and Planning. <b>FY 2021 Plans:</b> N/A <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred to PE 0401221F in FY2021.			
<b>Title:</b> KC-46 Test & Evaluation <b>Description:</b> Test & Evaluation (T&E) activities will be conducted to include the following types of activities: Development Test & Evaluation, Operational Test & Evaluation, Tanker Qualification, Receiver Certifications, Live Fire Test & Evaluation (LFT&E), Federal Aviation Administration (FAA) support, and other test planning and organizational support.  <b>FY 2020 Plans:</b> Continue using EMD, pre-delivery production, and/or LRIP aircraft to support Aerial Refueling (AR) tanker-receiver certification testing, Aerial Refueling Simulator Qualifications data collection, correction of deficiencies, and other T&E activities for the KC-46. Complete IOT&E events/reporting in support of the Full Rate Production decision. <b>FY 2021 Plans:</b> N/A <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred to PE 0401221F in FY2021.	38.425	10.840	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	77.852	45.693	0.000

**C. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	
• APAF 02 Line Item KC046A: KC-46A Tanker	2,238.932	2,139.705	-	-	-	-	-	-	-	-	Continuing	Continuing
• APAF 06 Line Item 000999: Initial Spares	231.457	0.000	-	-	-	-	-	-	-	-	Continuing	Continuing



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46	<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**Remarks**

**D. Acquisition Strategy**

The KC-46 Program acquisition strategy is to procure an existing commercial, FAA certified aircraft modified to meet USAF requirements. The KC-46 program released a final RFP on 24 Feb 2010, and entered source selection on 9 Jul 2010. The KC-46 program held a MS B DAB on 23 Feb 2011, received approval to enter EMD from the USD(AT&L) on 24 Feb 2011, and awarded the KC-46 contract to Boeing on 24 Feb 2011 to develop and procure 179 KC-46 aircraft. The KC-46 contract procurement was conducted via a full and open competition per Federal Acquisition Regulation (FAR) Part 15, and resulted in a FY 2011 EMD Fixed Price Incentive Firm (FPIF) contract. The EMD phase will develop, build, and test four KC-46 aircraft, and will qualify the KC-46 as a tanker and certify pairings with receiver aircraft.

The MS B acquisition strategy planned for two LRIP lots followed by 11 Full Rate Production (FRP) lots for a total aircraft procurement of 175 production aircraft. Updates to the acquisition strategy occurred in support of Milestone C (MS C) that increased LRIP from two to five lots and the remaining eight to be FRP lots with the total aircraft buy remaining at 175 Production aircraft (+4 EMD aircraft for a grand total of 179 aircraft).

LRIP consists of two Firm Fixed Price (FFP) and three FFP Not to Exceed (NTE) options (LRIP-1 Qty 7, LRIP-2 Qty 12, LRIP-3 Qty 15, LRIP-4 Qty 18, and LRIP-5 Qty 15). This will be followed by eight (Lots 6-13) FFP production options [via NTE values + Economic Price Adjustment (EPA)]. LRIP Lots 1 and 2 were awarded on 18 Aug 2016, LRIP Lot 3 was awarded on 27 Jan 2017, LRIP Lot 4 was awarded on 10 Sep 2018, and LRIP Lot 5 was awarded on 27 Sep 2019.

The ATS acquisition strategy is to provide ATDs, and associated support structure, to each MOB and the FTU. The ATS EMD FPIF contract with production options was conducted via a full and open competition per FAR Part 15, and awarded to FlightSafety Services Corporation in FY 2013. The ATS EMD phase will develop and procure ATDs; and will be supported with courseware, Training System Support Center, the technical data package, and support equipment to ensure system availability and concurrency with the aircraft. The first four ATS production options were exercised on 19 Aug 2015, 31 May 2017, 30 Apr 2018, and 31 Mar 2019.

The MTS acquisition strategy is to acquire MTDs, and associated support structure, for two AMC active duty Regional Maintenance Training Facilities. The MTS EMD FFP contract with production options was conducted via a full and open competition per FAR Part 15, and awarded to The Boeing Company in FY 2016. The MTS EMD phase will develop and procure MTDs; and will be supported with courseware, Training System Support Center, the technical data package, and support equipment to ensure system availability and concurrency with the aircraft.

The KC-46 Program is responsible for the development, testing, and production of a drogue-equipped, wing-mounted refueling system to meet Capability Production Document (CPD) thresholds and objectives for simultaneous refueling of two probe-equipped receivers. The system can be installed or removed from the KC-46 as mission needs dictate.

The long-term support concept for the KC-46 is organic two-level maintenance (2LM): organization level (O-level) and depot level (D-level). For the purposes of this program, all maintenance other than O-level shall be referred to as D-level. The product support strategy will initially employ Interim Contractor Support (ICS) before

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>	<b>Project (Number/Name)</b>
3600 / 5	PE 0605221F / KC-46	655271 / KC-46 RDT&E

transitioning to a 100% organically-managed maintenance and supply support capability. Performance Based Logistics (PBL) solutions will be evaluated during EMD as viable approaches to facilitate the transition.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46	<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A aircraft non-recurring development, integration, and testing; 4 RDT&E tanker aircraft; and support	C/FPIF	The Boeing Company : Seattle, WA	5,028.985	31.918	Jan 2020	30.054	Apr 2020	-		-		-	0.000	5,090.957	5,053.500
KC-46A Aircrew Training System	C/FPIF	FlightSafety Services Corp. : Centennial, CO	86.863	0.000		-		-		-		-	0.000	86.863	87.499
KC-46A Maintenance Training System	C/FFP	The Boeing Company : St. Louis, MO	46.090	0.327	Mar 2020	-		-		-		-	0.000	46.417	45.840
<b>Subtotal</b>			5,161.938	32.245		30.054		-		-		-	0.000	5,224.237	N/A

**Remarks**  
 The KC-46 EMD contract was awarded 24 Feb 2011. The total cost represents the current Program Office Estimate (POE) which accounts for the ceiling price of the contract plus the financial and schedule risk of potential design changes for the KC-46 aircraft.

FINANCIAL PERFORMANCE: The KC-46 is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, the KC-46 EMD contract is a FPIF contract with progress payments. Twenty percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A studies and analysis associated with the development, integration, and demonstration of KC-46 capability & future planning	C/CPAF	Various : Various	94.201	0.198	Apr 2019	-		-		-		-	0.000	94.399	-
<b>Subtotal</b>			94.201	0.198		-		-		-		-	0.000	94.399	N/A

**Remarks**  
 These contracts are on an as needed basis, with various contract types and performing activities.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46	<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A testing and planning support of development & operational test, FAA & military certification, and aircraft qualification activities	Various	Various : Various	190.870	38.425	Mar 2019	10.840	Mar 2020	-		-		-	0.000	240.135	-
<b>Subtotal</b>			190.870	38.425		10.840		-		-		-	0.000	240.135	N/A

**Remarks**  
Integrated testing and planning activities are performed by government organizations, with some contractor technical subject matter experts and teaming with the prime contractor.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A Program Management Administration - Program A&AS Support	C/FFP	US Falcon : Dayton, OH	64.657	4.847	Jul 2019	-		-		-		-	0.000	69.504	67.040
KC-46A Program Management Administration - Trainer A&AS Support	C/CPFF	HX5 : Fort Walton Beach, FL	11.575	0.000		-		-		-		-	0.000	11.575	11.520
KC-46A Program Management Administration - Other	Various	KC-46 Program Office : Dayton, W-P AFB, OH	42.993	2.137	Jun 2019	4.799	Mar 2020	-		-		-	0.000	49.929	-
<b>Subtotal</b>			119.225	6.984		4.799		-		-		-	0.000	131.008	N/A

**Remarks**  
Two Direct Mission Support contracts in FY20 over \$1M.



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46	<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>KC-46</b>																												
EMD: KC-46 Aircraft																												
Developmental Test and Evaluation to support aircraft delivery																												
Receiver Certification																												
Initial Operational Test and Evaluation																												
Government Testing for Correction of Deficiencies																												
Boom Telescope Actuator Redesign ECP																												
Mission Planning Support																												
Depot Maintenance Inter-Servicing (DMI), Source of Repair Assignment Process (SORAP), Activation Planning & FAA Certifications																												
Aircrew Training System Development and Updates																												
Maintenance Training System Development & Updates																												

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605221F / KC-46	<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>KC-46</b>				
EMD: KC-46 Aircraft	1	2019	4	2020
Developmental Test and Evaluation to support aircraft delivery	1	2019	1	2020
Receiver Certification	2	2019	3	2020
Initial Operational Test and Evaluation	4	2019	4	2020
Government Testing for Correction of Deficiencies	4	2019	4	2020
Boom Telescope Actuator Redesign ECP	4	2019	4	2020
Mission Planning Support	1	2019	4	2020
Depot Maintenance Inter-Servicing (DMI), Source of Repair Assignment Process (SORAP), Activation Planning & FAA Certifications	1	2019	4	2019
Aircrew Training System Development and Updates	1	2019	4	2020
Maintenance Training System Development & Updates	1	2019	3	2020

**Note**

Funding transferred to PE 040221F in FY 2021.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605223F / <i>Advanced Pilot Training</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	100.168	236.840	340.373	248.669	0.000	248.669	206.417	119.356	34.039	3.101	0.000	1,288.963
655340: <i>Advanced Trainer Replacement T-X</i>	100.168	236.840	340.373	248.669	0.000	248.669	206.417	119.356	34.039	3.101	0.000	1,288.963
Quantity of RDT&E Articles	2	3	-	-	-	-	-	-	-	-		

**Program MDAP/MAIS Code:** 436

**Note**

Prior Years Funding \$4.994M was executed in PE 0604233F.

**A. Mission Description and Budget Item Justification**

The Advanced Pilot Training (APT) program will replace the Air Education Training Command's (AETC) aging T-38C fleet with new aircraft, Ground Based Training System (simulators, training devices, computer based training systems, academics, etc.), Maintenance Training System, and support infrastructure currently used in the fighter/bomber advanced Specialized Undergraduate Pilot Training track as well as in the Introduction to Fighter Fundamentals program. The APT program acquisition strategy was approved by OSD (AT&L) in early FY 2017 (December 2016). At the same time, the APT Team completed their Development Request for Proposal (RFP) Release Defense Acquisition Board and subsequently released the RFP to industry on 30 December 2016. The Program completed source selection evaluations and Milestone B in September 2018 and awarded a Fixed Price Incentive Firm (FPIF) Indefinite Delivery/Indefinite Quantity contract to The Boeing Company on 27 September 2018.

Funding contained in this platform's documentation directly aids AETC flying training enterprise to continue its overall Future Years Defense Program pilot production increase starting in FY 2020, thus reducing the USAF Pilot Shortage.

The FY 2021 funding request was reduced by \$14.842 million to account for the availability of prior year execution balances.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the APT weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605223F / <i>Advanced Pilot Training</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	245.465	348.473	263.883	0.000	263.883
Current President's Budget	236.840	340.373	248.669	0.000	248.669
Total Adjustments	-8.625	-8.100	-15.214	0.000	-15.214
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-8.100			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-8.625	0.000			
• Other Adjustments	0.000	0.000	-15.214	0.000	-15.214
 <b>Change Summary Explanation</b>					
FY19: -\$8.625 million due to Small Business Innovative Research transfer					
FY20: -\$8.1 million due to congressional directed reductions for "forward financed".					
FY21: -\$14.842 million to account for the availability of prior year execution balances; remaining reduction amount due to economic adjustment.					

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Advanced Pilot Training (APT) Program	236.840	340.373	248.669
<b>Description:</b> The Advanced Pilot Training (APT) program has an approved acquisition strategy, completed Milestone B, and has progressed into the Engineering and Manufacturing Development (EMD) phase. In FY19 the APT program conducted the Aircraft Preliminary Design Review (PDR) and Critical Design Review (CDR) as well as the Ground Based Training System PDR. This effort includes studies, analysis, acquisition documentation, and market research activities to reduce risk and support the acquisition strategy and engineering and manufacturing development. It also includes Program Management Administration (PMA) such as travel, Other Government Costs (OGC), and Advisory and Assistance Services (A&AS).			
<b>FY 2020 Plans:</b> Program plans to conduct a GBTS CDR, close the Aircraft CDR, and continue developmental test and evaluation activities. Plans also include PMA such as travel, OGC's, and A&AS.			
<b>FY 2021 Plans:</b> Program plans to continue developmental test & evaluation, accept delivery of two engineering manufacturing test aircraft and multiple ground training devices. Plans also include PMA such as travel, OGC's and A&AS.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605223F / <i>Advanced Pilot Training</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Funding decreased due to the completion of GBTS CDR and ramp down of major design activities.			
<b>Accomplishments/Planned Programs Subtotals</b>	236.840	340.373	248.669

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• APAF 03 Line Item APT000: <i>Advanced Trainer Replacement T-X</i>	-	-	-	-	-	298.791	280.503	386.932	780.121	5,683.602	7,429.949
• APAF 06 Line Item APT000: <i>Advanced Trainer Replacement T-X</i>	-	-	-	-	-	29.878	28.500	37.765	61.258	488.058	645.459
• APAF 07 Line Item 000075: <i>Other Production Charges</i>	-	-	-	-	-	-	19.653	67.845	78.331	152.990	318.819
• OPAF 04 Line Item 845010: <i>Base Procured Equipment</i>	-	-	0.300	-	0.300	4.596	4.195	3.396	3.458	0.000	15.945
• MILCON PE 0804701F: <i>T-X (Advanced Pilot Trainer) Procurement</i>	-	31.600	23.400	-	23.400	-	51.184	15.614	32.916	0.000	154.714

**Remarks**

**E. Acquisition Strategy**  
 This Advanced Pilot Training (APT) Program will develop, test, acquire, and sustain an affordable, agile, and integrated APT System consisting of 351 aircraft, Ground Based Training System, Maintenance Training System, support, infrastructure, and personnel to meet Air Education and Training Command's initial need date of FY 2024.

The APT program's acquisition strategy leveraged market conditions by competing and awarding development, production, and initial sustainment in a single contract award. The program completed source selection evaluations and Milestone B in September 2018 and awarded a Fixed Price Incentive Firm Indefinite Delivery/Indefinite Quantity contract to The Boeing Company on 27 September 2018 to provide for development, integration, and testing needed to meet existing APT requirements. Additional contract options are available for Low Rate Initial Production, Full Rate Production and initial sustainment transition. The Maintenance Training System will be procured under a separate contractual vehicle.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 5				PE 0605223F / Advanced Pilot Training				655340 / Advanced Trainer Replacement T-X							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Advanced Pilot Training Contracts	Various	Various : TBD	75.608	215.260	Nov 2018	312.540	Nov 2019	208.023	Nov 2020	-		208.023	284.140	1,095.571	1,095.571
<b>Subtotal</b>			75.608	215.260		312.540		208.023		-		208.023	284.140	1,095.571	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Advanced Pilot Training Mission Support	Various	Various : Various	4.371	2.921	Jan 2019	2.606	Mar 2020	4.110	Jun 2021	-		4.110	1.840	15.848	-
<b>Subtotal</b>			4.371	2.921		2.606		4.110		-		4.110	1.840	15.848	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Advanced Pilot Training Test Support	Various	Edwards AFB : Edwards AFB, CA	1.475	8.862	Jan 2019	12.325	Jan 2020	22.140	Jan 2021	-		22.140	45.785	90.587	-
<b>Subtotal</b>			1.475	8.862		12.325		22.140		-		22.140	45.785	90.587	N/A
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Advanced Pilot Training A&AS	Various	AFLCMC : Dayton, OH	12.308	4.837	Mar 2019	6.206	Mar 2020	6.561	Mar 2021	-		6.561	16.500	46.412	-
Advanced Pilot Training PMA, Other Government Costs	Various	AFLCMC : Dayton, OH	6.406	4.960	Oct 2018	6.696	Oct 2019	7.835	Oct 2020	-		7.835	14.648	40.545	-
<b>Subtotal</b>			18.714	9.797		12.902		14.396		-		14.396	31.148	86.957	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Air Force							<b>Date:</b> February 2020					
<b>Appropriation/Budget Activity</b> 3600 / 5				<b>R-1 Program Element (Number/Name)</b> PE 0605223F / <i>Advanced Pilot Training</i>			<b>Project (Number/Name)</b> 655340 / <i>Advanced Trainer Replacement T-X</i>					
	<b>Prior Years</b>	<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
<b>Project Cost Totals</b>	100.168	236.840		340.373		248.669	-	248.669	362.913	1,288.963	N/A	

**Remarks**

Prior years amounts under Program 0604233F, Specialized Undergraduate Flight Training.  
 Advanced Pilot Training Studies and Analysis: \$0.935M  
 Advanced Pilot Training PMA Government Costs: \$1.383M  
 Advanced Pilot Training A&AS: \$2.676M

FINANCIAL PERFORMANCE: APT is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, however, the APT EMD contract is a FPIF contract with progress payments. Twenty percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605223F / <i>Advanced Pilot Training</i>	<b>Project (Number/Name)</b> 655340 / <i>Advanced Trainer Replacement T-X</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Advanced Pilot Training</b>																												
Engineering and Manufacturing Development (EMD) Phase																												
Aircraft Preliminary Design Review (PDR)																												
Aircraft Critical Design Review (CDR)																												
Ground Based Training Simulator (GBTS) Preliminary Design Review (PDR)																												
Ground Based Training Simulator (GBTS) Critical Design Review (CDR)																												
Development, Test and Evaluation																												
Milestone C																												
Operational Test Readiness Review (OTRR)																												
Initial Operational Test & Evaluation (IOT&E)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605223F / <i>Advanced Pilot Training</i>	<b>Project (Number/Name)</b> 655340 / <i>Advanced Trainer Replacement T-X</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Advanced Pilot Training</i></b>				
Engineering and Manufacturing Development (EMD) Phase	1	2019	3	2022
Aircraft Preliminary Design Review (PDR)	4	2019	4	2019
Aircraft Critical Design Review (CDR)	4	2019	4	2019
Ground Based Training Simulator (GBTS) Preliminary Design Review (PDR)	4	2019	4	2019
Ground Based Training Simulator (GBTS) Critical Design Review (CDR)	2	2020	2	2020
Development, Test and Evaluation	3	2019	2	2022
Milestone C	3	2022	3	2022
Operational Test Readiness Review (OTRR)	2	2023	3	2023
Initial Operational Test & Evaluation (IOT&E)	3	2023	2	2024

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605229F / <i>Combat Rescue Helicopter</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	1,228.220	430.483	247.047	63.169	0.000	63.169	29.936	21.840	1.498	2.097	55.000	2,079.290
654364: <i>Combat Rescue Helicopter</i>	1,228.220	430.483	247.047	63.169	0.000	63.169	29.936	21.840	1.498	2.097	55.000	2,079.290
Quantity of RDT&E Articles	9	-	1	-	-	-	-	-	-	-		

**Program MDAP/MAIS Code:** 479

**A. Mission Description and Budget Item Justification**

The HH-60W program will replace the aging HH-60G. The HH-60G currently supports the Air Force's core function of Personnel Recovery. The primary mission of the HH-60G is to conduct day / night / marginal weather Combat Search and Rescue (CSAR) in order to recover downed aircrew or other isolated personnel in hostile or non-permissive environments.

The HH-60W will be capable of employment day or night, in adverse weather, and across the full spectrum of threats to include chemical, biological, radiological, and nuclear. Onboard defensive capabilities will permit the HH-60W system to operate with less risk than legacy systems in an increased threat environment. An in-flight air refueling capability will provide an airborne alert capability and extend its combat mission range. The HH-60W system is capable of conducting combat search and rescue airborne mission commander duties. The aircraft will be self-supporting to the maximum extent practical. The HH-60W system may also conduct other collateral missions inherent in their capabilities to conduct Personnel Recovery, such as non-conventional assisted recovery, non-conventional evacuation operations, defense support to civil authorities, civil search and rescue, international aid, emergency aeromedical evacuation, disaster/humanitarian relief, counterdrug activities, support for National Aeronautics and Space Administration flight operations, and insertion/extraction of combat forces.

The HH-60W development program will procure a total of ten aircraft as follows: four Engineering, Manufacturing, and Development (EMD) aircraft, five System Demonstration Test Article (SDTA) aircraft, and one modernization flight test aircraft. The FY20 PB added the modernization flight test aircraft. In addition, the HH-60W program office will procure necessary ground and flight assets required for both Development Test (DT) and Initial Operational Test & Evaluation (IOT&E). The HH-60W EMD program includes development of the complete HH-60W training system to include HH-60W Weapon System Trainer (WST), Operational Flight Trainer (OFT), Airframe Systems Trainer (AST), Avionics Desktop Trainer (AVDTT), other training devices, with associated spares and support equipment, as well as Type 1 training and courseware required to perform flight, aircrew and maintenance training. Other development efforts include a systems integration laboratory, an avionics integration support facility, procurement of data rights and licenses, spares, SDTA aircraft, Government test, and product support. The HH-60W program will also pursue modernization efforts to develop and integrate enhancements in mission/defensive systems and additional system upgrades to address critical capability gaps. The program office will utilize the additional flight test aircraft in support of modernization efforts, including Infrared Countermeasures (IRCM) testing, to address emerging threats and evolving mission needs.

The Delta Training Device (DTD) effort will procure additional training assets, including but not limited to, maintenance Crew Chief Part Task Trainers (CCPTT) and aircrew Hoist Procedural Trainers (HPT) with associated spares and support equipment, as well as Type 1 training.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605229F / <i>Combat Rescue Helicopter</i>
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Capability upgrade and modernization development efforts for the HH-60W include, but are not limited to, the following priorities: Situational Awareness Data Link/ Automatic Direction Finder Removal, Distributed Aperture Infrared Countermeasures, Electro Optical/Infrared Tactical Overlay, Global Positioning System Anti-Jam/ Anti-Spoof, Degraded Visual Environment system, Integrated Vehicle Health Monitoring System Control, Video Data Link, Radio Frequency Jammer, Electronic Flight Bags, and Automated Dependent Surveillance Broadcast - In Device. Capability upgrade and modernization also supports inclusion for mandates, hardware changes for diminishing manufacturing sources and Deficiency Report Resolutions. In addition, studies, development, prototyping, testing and integration of emerging technology and support equipment opportunities to increase the effectiveness of the platform are considered in capability upgrade and modernization initiatives.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver HH-60W weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	445.652	247.047	37.711	0.000	37.711
Current President's Budget	430.483	247.047	63.169	0.000	63.169
Total Adjustments	-15.169	0.000	25.458	0.000	25.458
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-15.169	0.000			
• Other Adjustments	0.000	0.000	25.458	0.000	25.458

**Change Summary Explanation**

FY 2019 funding decrease of \$15.169M due to Small Business Innovation Research (SBIR).

FY 2021 funding increase of \$25.458M in accordance with Air Force service cost position adjustment that supports capability upgrade and modernization development efforts.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> HH-60W	414.296	204.645	2.312	-	2.312

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605229F / <i>Combat Rescue Helicopter</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
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**Description:** Develop a new helicopter, associated training system and support elements that leverage fielded, non-developmental technologies to recapitalize the HH-60G fleet.

**FY 2020 Plans:**  
Continue development efforts on HH-60W aircraft, training systems, modernization and associated product support, including acquiring an additional test aircraft. Consider rapid acquisition authorities, where possible, to develop and integrate mission/defensive systems to address capability gaps. Continue to develop the EMD and SDTA aircrafts and conduct required testing. Continue pre-operational support, training, maintenance support, facilities support, and integration. Continue studies, analysis and training courses.

**FY 2021 Base Plans:**  
Continue development efforts on HH-60W aircraft, training systems, modernization and associated product support, including developing and integrating mission/defensive systems to address capability gaps. Continue conducting required testing. Continue pre-operational support, training, maintenance support, facilities support, and integration. Continue studies, analysis and training courses.

**FY 2020 to FY 2021 Increase/Decrease Statement:**  
Funding decreased due to projected completion of the prime EMD effort. Modernization efforts are on-going.

<b>Title:</b> HH-60W Government Test and Evaluation	7.200	11.700	5.000	-	5.000
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**Description:** Conduct test and evaluation on the HH-60W and associated training systems to support Developmental Test and Evaluation, Operational Test and Evaluation, Live Fire Test and Evaluation, and other test planning and organizational support.

**FY 2020 Plans:**  
Continue to witness contractor qualification testing on subcomponents. Test and evaluate mission/defensive systems. Continue Operational Test and Evaluation planning. Conduct Developmental Test and Evaluation and Live Fire Test and Evaluation.

**FY 2021 Base Plans:**  
Test and evaluate mission/defensive systems. Continue Operational Test and Evaluation Planning, Developmental Test and Evaluation and Live Fire Test and Evaluation. Finalize developmental test report and

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605229F / <i>Combat Rescue Helicopter</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
prepare for Initial Operational Test & Evaluation test readiness review and transition into Initial Operational Test & Evaluation.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to ramping down of DT&E activities and transition into IOT&E.					
<b>Title:</b> Capability Upgrades & Modernization  <b>Description:</b> Modernize the HH-60W fleet by studying, prototyping testing and integrating developmental and non-developmental technologies into the platform.  <b>FY 2020 Plans:</b> Continue modernization efforts based on user prioritized capabilities, including mandates, hardware changes for diminishing manufacturing sources, Deficiency Report Resolutions, studies, prototyping, testing and integration of emerging technologies and support equipment opportunities. FY20 capability upgrade activities include software development for Situational Awareness Data Link (SADL)/Automatic Direction Finder (ADF) removal, Electro-Optical/Infrared Overlay, and Distributed Aperture Infrared Countermeasures (DAIRCM). The program is currently exploring additional research opportunities in GPS Anti-Jam/Anti Spoof and DVE upgrades.  <b>FY 2021 Base Plans:</b> Establish an agile, flexible, long-term contracting solution (ID/IQ type contracts) to efficiently award emerging modernization opportunities to further the effectiveness of the HH-60W fleet. Continue modernization efforts based on user prioritized capabilities, including mandates, hardware changes for diminishing manufacturing sources, Deficiency Report Resolutions, studies, prototyping, testing and integration of emerging technologies and support equipment opportunities. FY21 capability upgrade activities include in-line production and retrofit work on Situational Awareness Data Link (SADL)/Automatic Direction Finder (ADF) removal as well as software development and integration development for the Electro-Optical/Infrared Overlay and the Distributed Aperture Infrared Countermeasures (DAIRCM) modifications. The program is anticipating the ability to leverage new long-term ID/IQ contract for GPS Anti-Jam/Anti-Spoof and DVE development. Funding has been allocated to work towards the MUOS mandate.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased to support modernization efforts and awarding additional long-term modernization contracts.	8.987	30.702	55.857	-	55.857
<b>Accomplishments/Planned Programs Subtotals</b>	430.483	247.047	63.169	-	63.169

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605229F / <i>Combat Rescue Helicopter</i>
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**D. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• MILCON Line Item 0207229F: <i>Combat Rescue Helicopter</i>	5.900	15.500	4.049	-	4.049	16.304	0.000	4.289	0.000	0.000	46.042
• APAF 04 Line Item H060WH: <i>Combat Rescue Helicopter</i>	660.358	850.535	973.473	174.000	1,147.473	1,258.477	1,483.613	1,258.709	80.341	809.515	7,549.021
• APAF 06 Line Item H060WH: <i>Combat Rescue Helicopter</i>	0.000	0.000	75.821	0.000	75.821	96.803	64.836	81.922	111.591	0.000	430.973

**Remarks**

**E. Acquisition Strategy**

Procure a new helicopter and associated training systems, and support elements that leverage fielded non-developmental technologies to recapitalize the HH-60G fleet.

Under the HH-60W development effort, the program office will procure a total of ten aircraft as follows: four Engineering, Manufacturing, and Development (EMD) aircraft, five System Demonstration Test Article (SDTA) aircraft, and one modernization flight test aircraft. In addition, the HH-60W program office will procure necessary ground and flight assets required for both DT and IOT&E. The FY20 PB added a modernization flight test aircraft.

The main HH-60W program includes development of the complete HH-60W system to include delivery of ten aircraft, associated training systems, to include Weapon System Trainer (WST), Operational Flight Trainer (OFT), Avionics Desktop Trainer (AVDTT), Airframe Systems Trainer (AST), other Part Task Trainers, with associated spares and support elements/equipment, as well as Type 1 training and courseware required to perform flight, aircrew and maintenance training. An additional prime contract was awarded to develop and acquire additional training devices. Other efforts include, but are not limited to, development of a systems integration laboratory and an avionics integration support facility, as well as procurement of data rights and licenses, spares, SDTA and product support for the EMD effort. The HH-60W modernization effort will accelerate fielding of capability upgrades, where possible, while still in production, minimizing the need for future post-production modifications.

The current contract types for this effort are predominantly Fixed Price. As originally planned following source selection, a formal HH-60W Training System Requirements Analysis (TSRA) was completed in Sep 2015. This analysis identified additional training requirements not accounted for in the original contract. These additional training devices, associated spares, support equipment, Type 1 Training and initial contractor support was competitively awarded in Aug 18.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605229F / <i>Combat Rescue Helicopter</i>	<b>Project (Number/Name)</b> 654364 / <i>Combat Rescue Helicopter</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
HH-60W aircraft development, integration, test articles, trainers, support and contractor test	C/FPIF	Sikorsky Aircraft Corporation : Stratford, CT	1,152.891	384.908	Dec 2018	154.483	Jan 2020	-		-		-	0.000	1,692.282	-
Acquisition of additional HH-60W training devices	C/FFP	Logistics Services Int'l : TBD	9.000	12.000	Aug 2019	5.557	May 2020	-		-		-	0.000	26.557	-
HH-60W Capability Upgrades and Modernization	C/TBD	TBD : TBD	0.000	8.987	Jul 2019	30.702	Jan 2020	55.857	Dec 2020	-		55.857	106.331	201.877	-
<b>Subtotal</b>			1,161.891	405.895		190.742		55.857		-		55.857	106.331	1,920.716	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
HH-60W product support related to aircraft development, integration, test articles, trainers and contractor test	Various	Various : TBD	16.131	9.707	Jun 2019	44.605	Jun 2020	2.312	Jun 2021	-		2.312	4.040	76.795	-
<b>Subtotal</b>			16.131	9.707		44.605		2.312		-		2.312	4.040	76.795	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
HH-60W planning and testing to support developmental and operational test, live fire test and other weapon system testing and support	PO	413th Test Squadron : Eglin AFB, FL	19.403	7.200	Dec 2018	11.700	Dec 2019	5.000	Dec 2020	-		5.000	0.000	43.303	-
<b>Subtotal</b>			19.403	7.200		11.700		5.000		-		5.000	0.000	43.303	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605229F / <i>Combat Rescue Helicopter</i>	<b>Project (Number/Name)</b> 654364 / <i>Combat Rescue Helicopter</i>
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
HH-60W A&AS Support	C/CPFF	EPASS : Dayton, OH	23.193	5.568	Mar 2019	-		-		-		-	0.000	28.761	-
HH-60W Other PMA	Various	Various : Various	7.602	2.113	Dec 2018	-		-		-		-	0.000	9.715	-
<b>Subtotal</b>			30.795	7.681		-		-		-		-	0.000	38.476	N/A
<b>Project Cost Totals</b>			1,228.220	430.483		247.047		63.169		-		63.169	110.371	2,079.290	N/A

**Remarks**  
 FINANCIAL PERFORMANCE: HH-60W is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, however, the HH-60W EMD contract is a FPIF contract with progress payments. Twenty percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations, progress payment restrictions and DFAS withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

FY20+: Transitioned Management Services to 3010.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605229F / <i>Combat Rescue Helicopter</i>	<b>Project (Number/Name)</b> 654364 / <i>Combat Rescue Helicopter</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>HH-60W</b>	
HH-60W EMD Development	
HH-60W CRH Training System EMD Development	
HH-60W Test and Evaluation	
Developmental Test and Evaluation	
Milestone C	
Required Assets Available for Initial Operational Capability	
Capability Upgrades and Modernization	



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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605229F / <i>Combat Rescue Helicopter</i>	<b>Project (Number/Name)</b> 654364 / <i>Combat Rescue Helicopter</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>HH-60W</i></b>				
HH-60W EMD Development	1	2019	4	2023
HH-60W CRH Training System EMD Development	1	2019	4	2021
HH-60W Test and Evaluation	1	2019	3	2022
Developmental Test and Evaluation	4	2019	4	2021
Milestone C	4	2019	4	2019
Required Assets Available for Initial Operational Capability	2	2021	2	2021
Capability Upgrades and Modernization	4	2019	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 5: <i>System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605931F / <i>B-2 Defensive Management System</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	1,416.354	244.638	250.100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,911.092
653844: <i>B-2 DMS</i>	1,416.354	244.638	250.100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,911.092
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	

**Program MDAP/MAIS Code:** 431

**A. Mission Description and Budget Item Justification**

The B-2A Spirit is the world's most advanced long-range strike asset. The unique combination of range, payload and stealth (anti-access and global strike missions) characteristics allow the B-2 to target and destroy the highest value enemy targets, regardless of location, and return home safely. RDT&E projects are necessary to both preserve this strategic advantage as well as increase the flexibility and lethality of this national asset tasked across a broad spectrum, from tactical to national objectives.

This RDT&E program reflects the restructure of the current DMS-M EMD effort and transition to the modernization of the B-2 cockpit display sub-system. The current display sub-system lacks the processing power to provide necessary situational awareness to air crews in the projected dense threat environments of the future. Also, the legacy multi-function display units (MDUs) are not supportable due to obsolescence and repair issues. Without this program, display availability will severely impact aircraft availability.

During development, the engineering baseline will be finalized and production representative kits will be purchased to support SW development, platform integration, integrated development/operational test and a pre-Milestone C production assessment, as well as B-2 Nuclear Certification testing. Diminishing manufacturing sources and materiel shortages for affected components, will be addressed to protect the planned production program by mitigating unplanned part redesign and requalification risks. This effort will also require investment in systems engineering and software development to integrate the AGP into the B-2's P6 architecture that includes the legacy Threat Emitter Locator system and associated displays that were not part of the original DMS-M baseline.

In FY 2020 and prior, the B-2 DMS-M effort is documented in PE 0605931F B-2 DMS, Project 653844 B-2 DMS; beginning in FY 2021, this effort is documented in PE 0101127F B-2 Squadrons, Project 675345 B-2 Modernization.

Restructuring B-2 DMS-M saved \$9.8M in FY 2021: PE 0605931F is reduced \$164.610M, and PE 0101127F is increased \$154.768M.

Restructuring B-2 DMS-M Description: Delays in the acquisition of B-2 DMS-M reduced return on investment. In response to this shifting timeline, the Air Force realigns funding to address reliability and sustainment of the B-2 cockpit display system until end-of-life, while developing new capabilities aligned to the National Defense Strategy (NDS).

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605931F / <i>B-2 Defensive Management System</i>
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The FY 2021 budget reflects a significant restructure of the B-2 DMS-M program that reduces the program scope to modernize the B-2 display functionality including multi-function display units (MDUs) and Advanced Graphics Processor (AGP) of the baselined DMS-M program. Details associated with the restructured displays program are included in PE 0101127F.

The FY 2020 funds will be utilized to continue display system hardware and software development and testing including limited flight tests on the baselined DMS-M program, perform acquisition and contracting activities to efficiently reduce program scope, disposition equipment purchased under the EMD contract, remove hardware no longer required from development labs and flight test aircraft, perform systems engineering to develop a detailed architecture to integrate previously replaced legacy capabilities with modernized displays, procure legacy hardware including Threat Emitter Locator System (TELS) required to restore test aircraft capabilities that DMS-M is no longer modernizing.

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver B-2 DMS-M weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	253.258	294.400	164.610	0.000	164.610
Current President's Budget	244.638	250.100	0.000	0.000	0.000
Total Adjustments	-8.620	-44.300	-164.610	0.000	-164.610
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-44.300			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-8.620	0.000			
• Other Adjustments	0.000	0.000	-164.610	0.000	-164.610

**Change Summary Explanation**

FY 2019 reduction reflects \$8.6200M for Small Business Innovative Research (SBIR)

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605931F / <i>B-2 Defensive Management System</i>
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FY 2020 decrease reflects Congressional mark of \$44.300M due to unjustified growth in Management Services (\$34.300M) and Test and Evaluation funding early to need (\$10.000M)

FY 2021 decrease reflects restructure of current DMS-M EMD effort and transition to Multi-Function Display Unit Replacement (MDU-R) / Advanced Graphics Processor (AGP) development effort, and transfer of remaining funds to PE 0101127F.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> B-2 Defensive Management System Modernization (DMS-M) EMD	244.638	250.100	0.000
<b>Description:</b> DMS Modernization program develops improved aircrew situational awareness through replacement of passive antennas, receiver/processors, and display processors. DMS-M also addresses critical system shortfalls, and improves legacy DMS component repair issues.			
<b>FY 2020 Plans:</b> Accommodate transition from previous DMS-M scope to maximize software re-use for reduced display only program. Release RFP for multi-function display unit redesign, execute EMD efforts.			
<b>FY 2021 Plans:</b> N/A - Transitioned to PE 0101127F			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease reflects restructure of current DMS-M EMD effort and transition to MDU/AGP development effort.			
<b>Accomplishments/Planned Programs Subtotals</b>	244.638	250.100	0.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

Transitioned to PE 0101127F in FY 2021

**E. Acquisition Strategy**

See acquisition strategy in PE 0101127F for the B-2 DMS-M Displays program.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605931F / B-2 Defensive Management System	<b>Project (Number/Name)</b> 653844 / B-2 DMS
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Air Vehicle - Technology Development	SS/CPFF	Various : Various, NV	726.260	-		-		-		-		-	0.000	726.260	-
Air Vehicle - Engineering and Manufacturing Development (EMD)	SS/ Various	Various : Various, NV	580.860	196.120	Oct 2018	174.266	Oct 2019	0.000	Oct 2020	-		0.000	0.000	951.246	-
<b>Subtotal</b>			1,307.120	196.120		174.266		0.000		-		0.000	0.000	1,677.506	N/A

**Remarks**  
Northrop-Grumman, Palmdale, CA is the prime contractor and integrator.

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Trainers	C/CPIF	WPAFB : Dayton, OH	14.934	7.534	Nov 2018	17.966	Nov 2019	0.000	Nov 2020	-		0.000	0.000	40.434	-
Mission Planning	C/CPIF	Hanscom : Boston, MA	5.143	8.461	Feb 2019	22.271	Feb 2020	0.000	Feb 2021	-		0.000	0.000	35.875	-
<b>Subtotal</b>			20.077	15.995		40.237		0.000		-		0.000	0.000	76.309	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		0.000		-		0.000	0.000	0.000	-
Government Test	MIPR	AFFTC : Various, NV	29.399	16.470	Oct 2018	10.400	Oct 2019	0.000	Oct 2020	-		0.000	0.000	56.269	-
<b>Subtotal</b>			29.399	16.470		10.400		0.000		-		0.000	0.000	56.269	N/A

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605931F / B-2 Defensive Management System	<b>Project (Number/Name)</b> 653844 / B-2 DMS
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
PMA	Various	Various : Various, NV	59.758	16.053	Nov 2018	25.197	Nov 2019	0.000	Nov 2020	-		0.000	0.000	101.008	-
<b>Subtotal</b>			59.758	16.053		25.197		0.000		-		0.000	0.000	101.008	N/A

**Remarks**  
Funding supports the A&AS, government travel, WSSC lab support, and enterprise support contract with Northrop Grumman. Activities on the Northrop Grumman contract include but are not limited to, configuration management, security, test support, and risk management.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	1,416.354	244.638	250.100	0.000	-	0.000	0.000	1,911.092	N/A

**Remarks**  
Northrop-Grumman, the prime contractor for the B-2 weapon system, is the integrator and prime contractor for B-2 DMS activities.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605931F / <i>B-2 Defensive Management System</i>	<b>Project (Number/Name)</b> 653844 / <i>B-2 DMS</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>B-2 DMS</b>	
Multi-Functional Display Unit Replacement (MDU-R) RFP Release	█
MDU-R Contract Award	█
MDU-R EMD (FY21 and beyond in PE 0101127F)	██████



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0605931F / <i>B-2 Defensive Management System</i>	<b>Project (Number/Name)</b> 653844 / <i>B-2 DMS</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>B-2 DMS</i></b>				
Multi-Functional Display Unit Replacement (MDU-R) RFP Release	2	2020	2	2020
MDU-R Contract Award	3	2020	3	2020
MDU-R EMD (FY21 and beyond in PE 0101127F)	3	2020	4	2020

**Note**

FY 2021 DMS-M effort is documented in PE 0101127F B-2 Squadrons, Project 675345 B-2 Modernization.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101125F / <i>Nuclear Weapons Modernization</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	658.281	42.001	27.564	9.683	0.000	9.683	0.000	0.000	0.000	0.000	0.000	737.529
657007: <i>B61 LIFE EXTENSION PROGRAM</i>	658.281	42.001	27.564	9.683	0.000	9.683	0.000	0.000	0.000	0.000	0.000	737.529
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 468

**A. Mission Description and Budget Item Justification**

The purpose of this program element is to conduct and support United States Air Force (USAF) and Joint Department of Defense (DoD) / Department of Energy (DOE) acquisition activities for the modernization of nuclear weapons.

B61-12 Life Extension Program (LEP): The B61-12 LEP will integrate DOE efforts to extend the service life of the warhead with DoD efforts to develop a guided Tail Kit Assembly (TKA) required to maintain current B61 mission characteristics. Programmatic integration of the Air Force-led, joint DoD-DOE program is accomplished through the B61 LEP Project Officers Group (POG) and its subgroups. In accordance with Air Force Materiel Command mission assignment memo (dated 17 Feb 11) and National Nuclear Security Administration (NNSA)-Air Force Nuclear Weapons Center (AFNWC) Memorandum of Understanding (MOU dated 28 Jun 12), the USAF is responsible for development, acquisition and delivery of a guided TKA and All Up Round (AUR) technical integration, system qualification and fielding of the B61-12 variant on multiple platforms.

Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortage (DMSMS) issues.

This program element includes necessary civilian pay expenses required to manage, execute, and deliver B-61 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F or 0605833F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101125F / <i>Nuclear Weapons Modernization</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	81.592	27.564	9.700	0.000	9.700
Current President's Budget	42.001	27.564	9.683	0.000	9.683
Total Adjustments	-39.591	0.000	-0.017	0.000	-0.017
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-36.485	0.000			
• SBIR/STTR Transfer	-3.106	0.000			
• Other Adjustments	0.000	0.000	-0.017	0.000	-0.017
 <b>Change Summary Explanation</b>					
FY 2019 Reprogramming Actions (all reductions): \$26.485M FY19 Omnibus ATR to higher Air Force priorities; \$5.00M BTR to MM III; \$5.00M BTR to LRSO.					

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Engineering & Manufacturing Development Contract (B61)	18.816	18.092	0.092
<b>Description:</b> Prime contract to develop, test, integrate and nuclear certify a guided TKA in support of the B61-12 LEP.			
<b>FY 2020 Plans:</b> Continues B61-12 TKA test, integration, qualification and nuclear certification activities in support of the B61-12 LEP. Continues integration and testing of the B61-12 system, verification of requirements and validation of TKA performance. Continues all-up round system and IOT&E flight testing to validate aircraft flight environments in support of weapon development. Continues B61-12 TKA program practices that ensure the following are met: requirements flow down, requirement allocation to hardware and software, requirements compliance matrix, system performance, reliability, maintainability, product assurance, testability, producibility and supportability. Provides support to aircraft Operational Flight Plan (OFP) development and integration to deliver the OFP test tapes in support of IOT&E.			
<b>FY 2021 Plans:</b>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0101125F / <i>Nuclear Weapons Modernization</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Finalizes B61-12 TKA program practices to ensure the following are met: requirements flow down, requirement allocation to hardware and software, requirements compliance matrix, system performance, reliability, maintainability, product assurance, testability, producibility and supportability.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to conclusion of Engineering & Manufacturing Development.				
<b>Title:</b> All Up Round (AUR) Technical Integration (B61)  <b>Description:</b> Covers all system engineering tasks in support of AUR technical integration, qualification & fielding, including program support to the B61 LEP POG.  <b>FY 2020 Plans:</b> Continues B61-12 system qualification plan, warhead component qualification, TKA qualifications, and B61-12 AUR integration activities. Continues support to maintain technical and programmatic schedules and program documents that support the AUR technical integration. Continues maintenance of warhead-to-TKA interface requirements and design. Continues to provide technical expertise to maintain B61-12 aircraft compatibility with platforms through completion of the test and evaluation program. Continues to develop test assets to support integration and sustainment efforts at the aircraft system integration laboratories. Includes B61-12 AUR technical and programmatic reviews, including design reviews, systems reviews, technical interchange meetings, and test reviews. Also includes test assessments to validate modeling and simulation results in support of system qualification; configuration management of B61-12 AUR drawings, interface control documents, and system specifications; and support of trainers and other USAF-owned, DOE-designed configurations such as the Code Management System and ancillary equipment. Provides for management of system security requirements. Provides AUR integration support to the DOE in support of System Qualification drops. Efforts support the AUR Design Review and Acceptance Group (DRAAG).  <b>FY 2021 Plans:</b> Finalizes B61-12 system qualification plan, warhead component qualification, TKA qualifications, and B61-12 AUR integration activities, along with any support to maintain technical and programmatic schedules.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease due to conclusion of AUR Technical Integration.		3.400	0.901	0.100
<b>Title:</b> Aircraft Integration (B61)  <b>Description:</b> B61-12 activities associated with integration on threshold aircraft, including mission planning system upgrades to accommodate the new weapon variant. Also includes activities related to weapon design compatibility with both threshold and objective aircraft.		14.737	1.858	9.391

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 5: <i>System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101125F / <i>Nuclear Weapons Modernization</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
<p><b>FY 2020 Plans:</b> Continues aircraft F-15E integration activities and phases out B-2 integration to support B61-12 AUR technical integration and aircraft integration. Integration activities include verifications for TKA and AUR design verification. Continues integration of B-2, F-15E, F-16 system qualification testing for B61-12 AUR and B-2 mission planning.</p> <p><b>FY 2021 Plans:</b> Finalizes aircraft F-15E integration activities to support B61-12 AUR technical integration and aircraft integration. Integration activities include verifications for TKA and AUR design verification. Continues integration of B-2, F-15E, F-16 system qualification testing for B61-12 AUR and B-2 mission planning.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase reflects PMA to support end of EMD, since there is not a separate section on the R-2 to capture this.</p>			
<p><b>Title:</b> Test Support (B61)</p> <p><b>Description:</b> Test activities and support for TKA design validation &amp; verification and nuclear certification, as well as B61-12 AUR system qualification (includes design and operational certification activities).</p> <p><b>FY 2020 Plans:</b> Continues test planning and execution activities to support B61-12 weapon development, AUR technical integration and aircraft integration. Continues flight testing to verify aircraft flight environments and TKA and AUR design verification during IOT&amp;E and AUR System Qualification drops. Continues development and delivery of necessary BAs to accomplish TKA test and trainer activities. Continues providing support to the DOE flight tests for the bomb assembly. Continues execution of B-2, F-15E, F-16 system qualification testing for B61-12 AUR and B-2 mission planning.</p> <p><b>FY 2021 Plans:</b> Continues test planning and execution activities to support B61-12 weapon development, AUR technical integration and aircraft integration.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease due to end of test activities.</p>	5.048	6.713	0.100
<b>Accomplishments/Planned Programs Subtotals</b>	42.001	27.564	9.683

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• PAAF 01 354040: B61	140.323	80.773	35.634	-	35.634	2.797	0.000	0.000	-	0.000	259.527

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0101125F / <i>Nuclear Weapons Modernization</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**Remarks**  
For Appn PAAF, PE/Line Item 354040, the correct amount for FY19 is \$140.323M (annotated above). The amount shown in the 354040 B61 Procurement Document (\$152.223M) is not correct, as it does not take into account an \$11.9M Congressional mark.

**E. Acquisition Strategy**

The Milestone Decision Authority directed a three-fold competitive acquisition strategy at the 30 April 2012 Materiel Development Decision. 1) A single prime contractor was chosen to develop the B61-12 TKA through Engineering Manufacturing and Development (EMD) using full and open competition. EMD consists of two phases; 2) the prime contractor is to maintain competition at the subcomponent level; and 3) a sole source contract was awarded for production to the EMD contractor.

MS-C in 1QFY19 approved entry into Low Rate Initial Production/Lot 1 and the purchase of both long-lead items and life-of-type buys supporting Lot 2 Advanced Procurement for Full Rate Production.

B61-12 AUR integration, qualification and acceptance will be conducted through the joint DoD-DOE/NNSA Phase 6.X process and managed through the B61 LEP Project Officers Group (POG). Sandia National Laboratory will conduct the TKA/BA technical integration on behalf of the Air Force.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0101125F / Nuclear Weapons Modernization	<b>Project (Number/Name)</b> 657007 / B61 LIFE EXTENSION PROGRAM
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
B61 LEP EMD Contracts	C/CPIF	Boeing : St Charles, MO	311.490	12.036	Feb 2019	12.611	Nov 2019	0.092	Oct 2020	-		0.092	0.000	336.229	0.000
<b>Subtotal</b>			311.490	12.036		12.611		0.092		-		0.092	0.000	336.229	N/A

**Remarks**  
 FY20 EMD contract cost decrease due to ramp down of program testing.  
 FY21 EMD contract cost decrease due to conclusion of program testing.  
 EMD Phase II Period of Performance ends June 2020.

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AUR Technical Integration	MIPR	Various : various	67.734	3.400	Feb 2019	0.901	Jun 2020	0.100	Apr 2021	-		0.100	0.000	72.135	-
Aircraft Integration	MIPR	Various : various	171.759	14.737	Aug 2019	1.858	Feb 2020	7.391	Feb 2021	-		7.391	0.000	195.745	-
<b>Subtotal</b>			239.493	18.137		2.759		7.491		-		7.491	0.000	267.880	N/A

**Remarks**  
 FY20 & FY21 AUR Technical Integration cost decrease due to adjusted program schedule and ramp down/conclusion of integration activities.  
 FY20 & FY21 Aircraft Integration cost aligns with program schedule and requirements in aircraft integration activities.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support for B61 LEP Development	PO	96 TW : Eglin, FL	63.287	0.548	Aug 2019	0.553	Mar 2020	0.100	Mar 2021	-		0.100	0.000	64.488	-
526.1 Assets	MIPR	Various : Various	5.940	4.500	Apr 2019	6.160	Mar 2020	-		-		-	0.000	16.600	-
<b>Subtotal</b>			69.227	5.048		6.713		0.100		-		0.100	0.000	81.088	N/A



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0101125F / <i>Nuclear Weapons Modernization</i>	<b>Project (Number/Name)</b> 657007 / <i>B61 LIFE EXTENSION PROGRAM</i>
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

**Remarks**  
 FY20 526.1 Assets cost increase aligns with program schedule and rephase of dollars. Upon inception, funds were provided in FY19; funds realigned for better programmatic execution.  
 FY21 Test Support cost decrease aligns with program schedule and conclusion of test activities.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMA	Various	various : various	38.071	6.780	Mar 2019	5.481	Jan 2020	2.000	Jan 2021	-		2.000	0.000	52.332	-
<b>Subtotal</b>			38.071	6.780		5.481		2.000		-		2.000	0.000	52.332	N/A

**Remarks**  
 FY20 PMA cost decrease aligns with program schedule and ramp down in integration and test activities.  
 FY21 PMA dollars positioned for SBIR, MDAP, taxes, and corporate bills.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	658.281	42.001	27.564	9.683	-	9.683	0.000	737.529	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0101125F / <i>Nuclear Weapons Modernization</i>	<b>Project (Number/Name)</b> 657007 / <i>B61 LIFE EXTENSION PROGRAM</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>B61 LIFE EXTENSION PROGRAM</i></b>	
Engineering & Manufacturing Development Phase 1	█
Engineering & Manufacturing Development Phase 2	████████████████████
All-Up-Round Developmental/System Qualification Testing	████████████████████████████
Ground Test/WTT/Flight Test	████████████████████████████
Aircraft Integration	██
TKA Milestone C Decision	█

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0101125F / <i>Nuclear Weapons Modernization</i>	<b>Project (Number/Name)</b> 657007 / <i>B61 LIFE EXTENSION PROGRAM</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>B61 LIFE EXTENSION PROGRAM</i></b>				
Engineering & Manufacturing Development Phase 1	1	2019	1	2019
Engineering & Manufacturing Development Phase 2	1	2019	3	2020
All-Up-Round Developmental/System Qualification Testing	1	2019	4	2020
Ground Test/WTT/Flight Test	1	2019	4	2020
Aircraft Integration	1	2019	4	2021
TKA Milestone C Decision	1	2019	1	2019

**Note**

Engineering & Manufacturing Development Phase 2 has been extended to April 2020 in order to award debit/credit proposal.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207171F / F-15 EPAWSS
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	133.382	47.322	170.679	0.000	170.679	12.251	0.000	0.000	0.000	0.000	363.634
657108: <i>EPAWSS DEVELOPMENT</i>	0.000	133.382	47.322	170.679	0.000	170.679	12.251	0.000	0.000	0.000	0.000	363.634
Quantity of RDT&E Articles	-	2	-	-	-	-	-	-	-	-	-	

**Program MDAP/MAIS Code:** 485

**Note**  
 In FY 2016, PE 0207171F, F-15 EPAWSS, Project 676038, EPAWSS, Budget Activity 07, Operational Systems Development was transferred to PE 0207171F, F-15 EPAWSS, Project 657108, EPAWSS Development, Budget Activity 05, System Development and Demonstration to align the program in the correct budget activity.

In FY 2015, PE 0207134F, F-15E Squadrons, Project 670131, Initial Operational Test and Evaluation, F-15 EPAWSS development efforts were transferred to PE 0207171F, F-15 EPAWSS, Project 676038, EPAWSS in order to provide budget transparency.

Prior Years funding in FY 2013 and FY 2014 of \$15.100M was executed in PE 0207134F. Prior Year funding in FY 2015 of \$37.726M was executed in PE 0207171F, Project 676038.

**A. Mission Description and Budget Item Justification**  
 The current F-15's self-protection suite called the Tactical Electronic Warfare System (TEWS) is functionally obsolete. It uses 1970's analog technology designed for combat operations in environments defended by 1980s-era radar-based ground and air threats. In addition, this aging system is becoming more difficult and expensive to support. As a result, Air Force is replacing TEWS with the F-15 Eagle Passive/Active Warning and Survivability System (EPAWSS). F-15 EPAWSS is an advanced digital electronic warfare system capable of detecting, identifying, locating, denying, degrading, disrupting, and defeating modern and emerging threat systems in up to contested environments. This upgrade will significantly improve the F-15's capability to autonomously and automatically detect, identify and locate radio frequency (RF) threats as well as provide the ability to deny, degrade, deceive, disrupt and defeat RF and electro-optical/infrared (EO/IR) threat systems in contested and unplanned operations within highly contested environments through 2040. F-15 EPAWSS will provide indication, type and position of ground-based RF threats as well as the indication, type and bearing of airborne threats with the situational awareness needed to avoid, engage or negate the threat. It will also prevent RF and IR threat systems from detecting or acquiring accurate targeting information prior to threat engagement to complicate and/or negate an enemy threat targeting solution and effectively counter enemy missiles/weapons if adversary threat systems engage and employ weapons against friendly forces through components such as chaff, flares, decoys/angle countermeasures and jamming.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver F-15 EPAWSS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)	<b>R-1 Program Element (Number/Name)</b> PE 0207171F / F-15 EPAWSS
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This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	137.095	47.322	23.942	0.000	23.942
Current President's Budget	133.382	47.322	170.679	0.000	170.679
Total Adjustments	-3.713	0.000	146.737	0.000	146.737
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.713	0.000			
• Other Adjustments	0.000	0.000	146.737	0.000	146.737

**Change Summary Explanation**

FY2021 increase for F-15 EPAWSS requirements

**C. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Eagle Passive/Active Warning Survivability System (EPAWSS)	133.382	47.322	170.679	0.000	170.679
<b>Description:</b> Planned replacement of the existing F-15 self-protection, Tactical Electronic Warfare System (TEWS). This includes technical and acquisition related studies.					
<b>FY 2020 Plans:</b> Continue test aircraft modifications. Continue developmental ground and flight tests, software integration, qualification testing, and test program set development. Complete electronic warfare design verification testing and hardware production. Funds may be used to resolve emerging safety of flight issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.					
<b>FY 2021 Base Plans:</b> Complete test aircraft modifications and qualification testing. Continue developmental ground and flight tests, software integration, and test program set development. Funds may be used to resolve emerging safety of flight					

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207171F / <i>F-15 EPAWSS</i>
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The budget increase from FY20 to FY21 is a result of program delays caused by design maturity and producibility challenges with electronic warfare hardware. This left the program with insufficient quantities of hardware to support parallel installation, integration, and test activities. Although these hardware challenges are largely resolved, the resulting inefficiencies had a compounding effect on the program's overall cost and schedule. As a result, significant development work continues in FY21 including the completion of the program's last flight test jet modification along with flight and ground testing.					
<b>Accomplishments/Planned Programs Subtotals</b>	133.382	47.322	170.679	0.000	170.679

**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item	147.685	125.417	31.995	-	31.995	308.509	337.335	265.765	270.625	1,256.110	2,743.441
F15EWS: <i>Aircraft Modification</i>											
• APAF 07 Line Item 000999:	-	4.185	8.036	-	8.036	10.204	19.580	11.086	11.289	33.985	98.365
<i>Aircraft Spares and Repair Parts</i>											
• APAF 07 000075:	-	-	52.058	-	52.058	37.388	-	-	-	0.000	89.446
<i>OTHER PRODUCTION CHARGES (OVERVIEW)</i>											

**Remarks**

FY 2019 - FY 2023 funding is for F-15E Increment 1 Procurement.

**E. Acquisition Strategy**

F-15 EPAWSS is using an evolutionary acquisition model consisting of two increments. Increment 1 replaces the existing radar warning receiver, internal countermeasure system and countermeasure dispenser system. Increment 2 adds a towed decoy and monopulse angle countermeasure capability. F-15 EPAWSS technical approach is to leverage mature technology where possible from other Air Force or Foreign Military Sales electronic warfare programs. To rapidly field this capability, F-15 EPAWSS is using two decision points in-lieu of a single Milestone C. Decision Point #1 will initiate production activities. Decision Point #2 will initiate

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	PE 0207171F / <i>F-15 EPAWSS</i>

installation activities. This tailoring provides the Milestone Decision Authority the ability to accelerate Initial Operational Capability by reducing the schedule impact of kit lead times.



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207171F / F-15 EPAWSS	<b>Project (Number/Name)</b> 657108 / EPAWSS DEVELOPMENT
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
F-15 EPAWSS TMRR	SS/ Various	Boeing : St. Louis, MO	0.000	-		-		-		-		-	0.000	0.000	175.860
F-15 EPAWSS EMD	SS/ Various	Boeing : St. Louis, MO	0.000	112.923	Feb 2019	29.596	Feb 2020	135.321	Feb 2021	-		135.321	9.763	287.603	478.786
F-15 EPAWSS	Various	Various : Various	0.000	6.744	Mar 2019	10.328	Feb 2020	10.241		-		10.241	2.205	29.518	115.854
<b>Subtotal</b>			0.000	119.667		39.924		145.562		-		145.562	11.968	317.121	N/A

**Remarks**  
 FY16PB- EPAWSS efforts were transferred from Budget Activity 7, Operational Systems Development, PE 0207171F, Project Number 676038 to Budget Activity 5, Engineering and Manufacturing Development, PE 0207171F, Project Number 657108 per OSD direction.

The individual program reference to "various" contract methods addresses other government costs for trainers, hardware, special studies, etc., that are required to meet F-15 EPAWSS program objectives. The execution vehicles between these DoD entities vary by effort.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Government Flight Test	Various	Various : Various	0.000	11.208	Jan 2019	6.201	Jan 2020	23.235		-		23.235	0.000	40.644	72.735
<b>Subtotal</b>			0.000	11.208		6.201		23.235		-		23.235	0.000	40.644	N/A

**Remarks**  
 The individual program reference to "various" contract methods addresses other government costs for trainers, test, hardware, special studies, etc. that are required to meet F-15 EPAWSS program objectives. The execution vehicles between these DoD entities vary by effort.

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207171F / F-15 EPAWSS	<b>Project (Number/Name)</b> 657108 / EPAWSS DEVELOPMENT
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support Costs	Various	Various : Various	0.000	2.507	Feb 2019	1.197	Feb 2020	1.882		-		1.882	0.283	5.869	44.399
<b>Subtotal</b>			0.000	2.507		1.197		1.882		-		1.882	0.283	5.869	N/A

**Remarks**  
The individual program reference to "various" contract methods addresses other government costs for trainers, test, hardware, special studies, etc. that are required to meet F-15 EPAWSS program objectives. The execution vehicles between these DoD entities vary by effort.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	0.000	133.382	47.322	170.679	-	170.679	12.251	363.634	N/A

**Remarks**  
Prior Years funding in FY 2013 and FY 2014 of \$15.100M was executed in PE 0207134F.  
Prior Year funding in FY 2015 of \$37.726M was executed in PE 0207171F, Project 676038.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207171F / F-15 EPAWSS	<b>Project (Number/Name)</b> 657108 / EPAWSS DEVELOPMENT
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>F-15 EPAWSS</b>	
Developmental Test	
EPAWSS Milestone C - Decision Point 1	
EPAWSS Decision Point 2	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207171F / <i>F-15 EPAWSS</i>	<b>Project (Number/Name)</b> 657108 / <i>EPAWSS DEVELOPMENT</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>F-15 EPAWSS</i></b>				
Developmental Test	1	2019	2	2023
EPAWSS Milestone C - Decision Point 1	1	2021	1	2021
EPAWSS Decision Point 2	3	2022	3	2022

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207328F / <i>Stand In Attack Weapon</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	14.542	162.840	160.438	0.000	160.438	165.052	218.552	151.249	364.537	Continuing	Continuing
653133: <i>Stand In Attack Weapon</i>	-	14.542	162.840	160.438	0.000	160.438	165.052	218.552	151.249	364.537	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Stand In Attack Weapon (SiAW) system will provide the capability to strike rapidly re-locatable targets that create the Anti-Access/Area Denial (A2/AD) environment. SiAW targets include Theater Ballistic Missile Launchers, Land Attack and Anti-Ship Cruise Missile launchers, GPS jammers, Anti-Satellite Systems, and Integrated Air Defense Systems. The path to the SiAW capability is through the Navy's Advanced Anti-Radiation Guided Missile-Extended Range (AARGM-ER) program with added Air Force capabilities including a new warhead/fuze and F-35 integration (including Universal Armament Interface [UAI] and Mission Planning). The Air Force plans to upgrade the AARGM-ER with advanced technologies to achieve full SiAW capability.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	14.975	162.840	142.725	0.000	142.725
Current President's Budget	14.542	162.840	160.438	0.000	160.438
Total Adjustments	-0.433	0.000	17.713	0.000	17.713
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.433	0.000			
• Other Adjustments	0.000	0.000	17.713	0.000	17.713

**Change Summary Explanation**

FY 2019 reduction of \$0.433M for SBIR

FY 2021 increase of \$17.713M for increased F-35 integration scope

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)	<b>R-1 Program Element (Number/Name)</b> PE 0207328F / Stand In Attack Weapon
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<p><b>Title:</b> Warhead / Electronic Safe and Arm Fuze (ESAF) Development</p> <p><b>Description:</b> Development of a new warhead and ESAF to support AARGM-ER and SiAW. Will design, test, and certify new warhead/ESAF.</p> <p><b>FY 2020 Plans:</b> Continue working the warhead/ESAF development and qualification. Continue working with the USN AARGM-ER Program Office on detailed design, test, and integration.</p> <p><b>FY 2021 Base Plans:</b> Complete warhead/ESAF development and qualification. Continue working with the USN AARGM-ER Program Office on detailed design, test, and integration.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to warhead design completing in FY21.</p>	6.900	20.301	16.328	0.000	16.328
<p><b>Title:</b> Universal Armament Interface (UAI) / Anti-Radiation Homing (ARH) message</p> <p><b>Description:</b> Develop and test a UAI/ARH message set for the AARGM-ER/SiAW missile.</p> <p><b>FY 2020 Plans:</b> Continue design and early validation of the UAI/ARH message set to be compatible with the F-35.</p> <p><b>FY 2021 Base Plans:</b> Continue test, certification and validation of the UAI/ARH message set on the F-35.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased due to design completing in FY20.</p>	0.400	15.336	12.558	-	12.558
<p><b>Title:</b> F-35 Integration</p> <p><b>Description:</b> Integration of the AARGM-ER/SiAW missile onto the F-35. Efforts for aircraft integration will address the F-35 aircraft software development, Mission Planning capability in Joint Mission Planning System (JMPS), engineering to support weapon integration, testing, and airworthiness certification for the missile carriage and employment efforts.</p>	0.000	38.763	47.078	0.000	47.078







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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207328F / <i>Stand In Attack Weapon</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 07 0205601N: <i>Harm Improvements</i>	99.240	119.649	49.605	-	49.605	34.825	42.249	48.225	-	0.000	393.793

**Remarks**

Other Program funds - US Navy AARGM-ER Program Office: HARM Improvements /Operations Systems Development US Navy appropriation RDT&E 1319

**E. Acquisition Strategy**

The Stand-in Attack Weapon (SiAW) program acquisition strategy is to leverage the Navy's Advanced Anti-Radiation Guided Missile-Extended Range (AARGM-ER) program with added Air Force capabilities including a new warhead/ESAF and F-35 integration (including Universal Armament Interface and Mission Planning). The Navy will be the lead for missile development and the Air Force will be the lead for F-35 integration. The SiAW program office will utilize the Navy's contracts and the F-35 joint program office contracts to accomplish integration of AARGM-ER on the F-35. The Air Force plans to upgrade AARGM-ER in the future with advanced technologies to achieve full SiAW capability.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207328F / <i>Stand In Attack Weapon</i>	<b>Project (Number/Name)</b> 653133 / <i>Stand In Attack Weapon</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Warhead / ESAF Development	Various	NGIS : Northridge, CA	-	6.900	Mar 2019	20.301	Dec 2019	16.328	Dec 2020	-		16.328	Continuing	Continuing	-
Universal Armament Interface (UAI) Anti-Radiation Homing message (ARH) & Mission Planning (MP)	Various	Various : Various	-	0.400	Mar 2019	15.336	Mar 2020	12.558	Mar 2021	-		12.558	Continuing	Continuing	-
F-35 Integration	Various	Various : Various	-	0.000		38.763	May 2020	47.078	May 2021	-		47.078	Continuing	Continuing	-
Advance Technology Risk Reduction	Various	Various : Various	-	0.880	Mar 2019	57.800	Jan 2020	35.500	Dec 2020	-		35.500	Continuing	Continuing	-
<b>Subtotal</b>			-	8.180		132.200		111.464		-		111.464	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Test Support (includes flight test equipment, targets, 96TW and range support and SEEK Eagle support)	Various	96 TW : Eglin AFB, FL	-	3.629		13.865		26.817		-		26.817	Continuing	Continuing	-
Test Asset & Test Support	MIPR	Northrup Grumman : Northridge, CA	-	-		8.199	Mar 2020	13.530	Mar 2021	-		13.530	Continuing	Continuing	-
<b>Subtotal</b>			-	3.629		22.064		40.347		-		40.347	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration (PMA)	TBD	Various : Eglin AFB, FL	-	2.733		8.576		8.627		-		8.627	Continuing	Continuing	-
<b>Subtotal</b>			-	2.733		8.576		8.627		-		8.627	Continuing	Continuing	N/A



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**Exhibit R-4, RDT&E Schedule Profile:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207328F / <i>Stand In Attack Weapon</i>	<b>Project (Number/Name)</b> 653133 / <i>Stand In Attack Weapon</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Warhead &amp; ESAF Development</b>	
Design Warhead & Electronic Safe and Arm Fuze	
<b>UAI / ARH</b>	
Design, test and validate UAI / ARH message set	
<b>F-35A Integration</b>	
Integration of SiAW into the internal weapon bay on F-35A	
<b>Advanced Technology Risk Reduction</b>	
Emerging technology maturation for future SiAW tech insertion.	
<b>SiAW Targets and Test Support</b>	
Flight test support, range modifications, & targets	
<b>SiAW Program Management</b>	
Oversight of SiAW development and F-35A integration	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207328F / <i>Stand In Attack Weapon</i>	<b>Project (Number/Name)</b> 653133 / <i>Stand In Attack Weapon</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Warhead &amp; ESAF Development</i></b>				
Design Warhead & Electronic Safe and Arm Fuze	3	2019	4	2023
<b><i>UAI / ARH</i></b>				
Design, test and validate UAI / ARH message set	3	2019	4	2023
<b><i>F-35A Integration</i></b>				
Integration of SiAW into the internal weapon bay on F-35A	2	2020	4	2025
<b><i>Advanced Technology Risk Reduction</i></b>				
Emerging technology maturation for future SiAW tech insertion.	4	2019	4	2023
<b><i>SiAW Targets and Test Support</i></b>				
Flight test support, range modifications, & targets	4	2019	4	2025
<b><i>SiAW Program Management</i></b>				
Oversight of SiAW development and F-35A integration	2	2019	4	2023

**Note**

USAF will follow AARGM-ER's Acquisition Milestone Schedule. FY20 includes Critical Design Review (CDR).

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 5: <i>System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0207701F / <i>Full Combat Mission Training</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.978	9.797	9.422	0.000	9.422	6.999	7.125	7.252	7.386	Continuing	Continuing
655012: <i>Full Combat Mission Training</i>	-	0.978	9.797	9.422	0.000	9.422	6.999	7.125	7.252	7.386	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

Full Combat Mission Training (FCMT) supports Air Force Distributed Mission Operations (DMO) and Live-Virtual-Constructive (LVC) integration. DMO is an operational readiness initiative enabling the USAF to exercise and train at the operational and strategic levels of war while facilitating unit-level training. FCMT funding provides research in areas benefiting the AF DMO/LVC environment as a whole. Provides research and development to facilitate integration of fielded and newly acquired, Air Force owned training devices into DMO/LVC networks. Enhances the quality of training for the systems added to the network. Enables aircrews to network with LVC components to form the integrated DMO battlespace. Links geographically distributed high-fidelity combat and combat support training devices including Command and Control and Intelligence, Surveillance, and Reconnaissance systems. Develops, demonstrates and inserts multi-level security capability. This capability allows the warfighters at home station to exercise and train at the operational and strategic levels of war as well as conduct networked unit-level training.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Full Combat Mission Training capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	1.015	9.797	9.846	0.000	9.846
Current President's Budget	0.978	9.797	9.422	0.000	9.422
Total Adjustments	-0.037	0.000	-0.424	0.000	-0.424
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.037	0.000			
• Other Adjustments	0.000	0.000	-0.424	0.000	-0.424

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0207701F / Full Combat Mission Training				<b>Project (Number/Name)</b> 655012 / Full Combat Mission Training			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
655012: Full Combat Mission Training	-	0.978	9.797	9.422	0.000	9.422	6.999	7.125	7.252	7.386	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Full Combat Mission Training (FCMT) supports Air Force Distributed Mission Operations (DMO) and Live-Virtual-Constructive (LVC) integration. DMO is an operational readiness initiative enabling the USAF to exercise and train at the operational and strategic levels of war while facilitating unit-level training. FCMT funding provides research in areas benefiting the AF DMO/LVC environment as a whole. Provides research and development to facilitate integration of fielded and newly acquired, Air Force owned training devices into DMO/LVC networks. Enhances the quality of training for the systems added to the network. Enables aircrews to network with LVC components to form the integrated DMO battlespace. Links geographically distributed high-fidelity combat and combat support training devices including Command and Control and Intelligence, Surveillance, and Reconnaissance systems. Develops, demonstrates and inserts multi-level security capability. This capability allows the warfighters at home station to exercise and train at the operational and strategic levels of war as well as conduct networked unit-level training.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> FCMT Cross Domain Solutions (CDS)	0.234	1.714	1.638
<b>Description:</b> Development, demonstration, and insertion of multi-level security (MLS) capability.			
<b>FY 2020 Plans:</b>			
- Continue accreditation for coalition rule sets			
- Continue fourth to fifth generation MLS rule development for routine LVC environment integration			
- Evaluate and assess commercial and government off-the-shelf cross domain solution devices			
- Develop updates for cross domain rule sets			
- Validate CDS at upgraded classification/program levels with local Air Force Research Laboratory space boundary			
<b>FY 2021 Plans:</b>			
Continues capability development efforts and testing of multi-level security rule-set development to add multi-domain command and control capability to the synthetic training environment.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			
Funding decrease FY20 to FY21 is due to economic adjustments.			
<b>Title:</b> FCMT Develop DMO Capabilities	0.270	4.594	4.381



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207701F / Full Combat Mission Training	<b>Project (Number/Name)</b> 655012 / Full Combat Mission Training		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> Development, demonstrations, studies and insertions of DMO/LVC related technologies and proficiency based continuation training strategies.</p> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- Continue validation and accreditation of integrated scenarios and syllabi across DMO environments at a high fidelity to demonstrate persistent performance measurement and readiness assessment in 4th to 5th generation LVC events, and evaluate integration of different data management and tracking methods to support large scale, secure and persistent Joint and Coalition LVC events</li> <li>- Validate MTC code upgrades in testbeds with operators</li> <li>- Bring advanced research training testbeds up to higher classification levels to commence full on fighter integration (F-16, F-22, and F-35) and accomplish accreditations at higher classification and program levels</li> <li>- Develop joint and collation data standards and evaluate data management methods to support LVC events</li> </ul> <p><b>FY 2021 Plans:</b></p> <p>Continues RDT&amp;E efforts to leverage capability of the Joint Synthetic Environment (JSE) to develop proficiency evaluations and determine standard format(s) for storing/analyzing proficiency data. Continue to refine learning managed scenario(s) and integrate with LVC events.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p> <p>Funding decrease FY20 to FY21 is due to economic adjustments.</p>				
<p><b>Title:</b> FCMT Validation of warfighter seasoning and development of objective performance enhancements</p> <p><b>Description:</b> Studies to assess and validate warfighter seasoning in continuation training and accreditation of portions of this process; studies to develop objective enhancement and measurement tools for the DMO/LVC environment.</p> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>- Continue research and development for the integration of F-35, Joint and Coalition Trainers into the CAF DMO network</li> <li>- Continue interoperability studies to evaluate the training value of fifth generation interoperable coalition training on the CAF DMO network</li> <li>- Continue the validation of rule sets for the LVC environment and evaluate network architectures and typologies for distributed secure LVC events out across joint and coalition players</li> <li>- Continue to develop metrics and tools to measure training proficiency gained during LVC events</li> </ul> <p><b>FY 2021 Plans:</b></p>		0.291	2.104	2.048

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207701F / Full Combat Mission Training	<b>Project (Number/Name)</b> 655012 / Full Combat Mission Training		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Continue development of joint and coalition data standards and evaluate data management methods to support LVC events. Accelerates F-35 integration at the Virtual Test & Training Center (VTTC) to achieve coalition and joint training capability objectives.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decrease FY20 to FY21 is due to economic adjustments.				
<b>Title:</b> FCMT Other Network Studies  <b>Description:</b> Research and development to provide for the integration of fielded and newly introduced, Air Force, Joint and Coalition high-fidelity flight and mission trainers.  <b>FY 2020 Plans:</b> - Demonstrate integration of F-35, Joint and Coalition Trainers into the CAF DMO network - Conclude interoperability studies to evaluate the training value of fifth generation interoperable coalition training on the CAF DMO network - Continue development of common Joint and Coalition data standards for secure, interoperable training at joint and coalition levels of analysis - Continue demonstrations of persistent performance measurement and readiness assessment in fourth to fifth generation LVC events - Continue development of gateways and CDS to integrate high-fidelity trainers with Air Force, joint, and coalition networks  <b>FY 2021 Plans:</b> Supports essential RDT&E efforts to integrate enterprise models (weather, terrain, threats, etc....) and common computer generated forces to achieve level 4 training capability at Distributed Training Centers (DTCs).  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decrease FY20 to FY21 is due to economic adjustments.		0.183	1.385	1.355
<b>Accomplishments/Planned Programs Subtotals</b>		0.978	9.797	9.422
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207701F / <i>Full Combat Mission Training</i>	<b>Project (Number/Name)</b> 655012 / <i>Full Combat Mission Training</i>

**D. Acquisition Strategy**

Each platform joining the DMO/LVC environment selects its own acquisition strategy based on Using Command needs, Economic Analysis, and the magnitude of the training system changes required to provide DMO capability. The initial systems in the DMO/LVC environment; F-15C/E, Airborne Warning and Control System, and F-16 Block 40/50, all required new training systems. Additionally, the Operations and Integration capability was created. The Training Simulation Service (TSS) acquisition strategy was used to meet a portion of these requirements. In the TSS approach, the contractor owns and provides the simulator equipment, maintains simulator concurrency with weapon systems, and has incentives to keep the equipment up to date with simulator and network technologies. Currently fielded and projected Air Force-owned Flight and Mission Training Systems without DMO/LVC capability will be modified using FCMT funds to ensure compatibility with the DMO/LVC environment. To accomplish this, the Air Force Research Laboratory will conduct research/studies to Develop/implement CDS, develop DMO capabilities, validate warfighter seasoning, develop objective performance enhancements, and conduct other network studies.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 5				PE 0207701F / Full Combat Mission Training				655012 / Full Combat Mission Training							
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
FCMT Cross Domain Solutions (CDS): Development, Testing and insertion of Multi-level-security protocols, Cross Domain rule set development and accreditation	Various	Air Force Research Lab, 711 Human Performance Wing, Human : Dayton, OH	-	0.234	Jan 2019	1.714	Jan 2020	1.639	Jan 2021	-		1.639	Continuing	Continuing	-
FCMT Develop DMO Capabilities: demonstration, studies and insertion of distributed mission ops related technologies and proficiency based continuation training	Various	Air Force Research Lab, 711 Human Performance Wing : Dayton, OH	-	0.270	Jan 2019	4.594	Jan 2020	4.380	Jan 2021	-		4.380	Continuing	Continuing	-
FCMT Validation of warfighter seasoning and development of objective performance enhancements for DMO/ LVC environment	Various	Air Force Research Lab, 711 Human Performance Wing : Dayton, OH	-	0.291	Jan 2019	2.104	Jan 2020	2.048	Jan 2021	-		2.048	Continuing	Continuing	-
FCMT Other Network Studies: Research and Development to support integration of newly fielded high-fidelity training systems and networks	Various	Air Force Research Lab, 711 Human Performance Wing : Dayton, OH	-	0.183	Jan 2019	1.385	Jan 2020	1.355	Jan 2021	-		1.355	Continuing	Continuing	-
<b>Subtotal</b>			-	0.978		9.797		9.422		-		9.422	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	0.978		9.797		9.422		-		9.422	Continuing	Continuing	N/A





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**Exhibit R-4, RDT&E Schedule Profile:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207701F / Full Combat Mission Training	<b>Project (Number/Name)</b> 655012 / Full Combat Mission Training
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Develop and integrate After Action Review tools for Mission Training Centers	[REDACTED]																											
Develop metrics and tools to measure training proficiency gained during LVC events / standardize implementation at Distributed Training Centers (DTCs)	[REDACTED]																											
Integrate 5th generation systems into DMO network	[REDACTED]																											
Conduct interoperability studies to evaluate the training value of fifth generation interoperable coalition training on the CAF DMO network	[REDACTED]																											
Develop joint and coalition data standards and evaluate data management methods to support live, virtual, and constructive events	[REDACTED]																											
Evaluation of the integration of different data management and tracking methods to support large scale, secure and persistent Joint and Coalition LVC events.	[REDACTED]																											
Demonstrate persistent performance measurement and readiness assessment in fourth to fifth generation LVC events	[REDACTED]																											
Evaluate network architectures and typologies for distributed secure LVC events	[REDACTED]																											
Develop gateways and cross domain solutions to integrate high-fidelity trainers with Air Force, joint, and coalition networks	[REDACTED]																											
Evaluate compressed DIS network standards for CDS in DMO	[REDACTED]																											

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207701F / Full Combat Mission Training	<b>Project (Number/Name)</b> 655012 / Full Combat Mission Training
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Integrate and evaluate multi-domain operations and kill-chain training scenarios for contested environments	[REDACTED]
Evaluate multi-national mission planning and debrief technologies in research training events	[REDACTED]
Implement, evaluate, and field technologies aligned with future training strategies for LVC	[REDACTED]



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207701F / <i>Full Combat Mission Training</i>	<b>Project (Number/Name)</b> 655012 / <i>Full Combat Mission Training</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Full Combat Mission Training</b>				
Develop Multi-Level Security testbed and support testing on 5th Gen systems	2	2020	2	2022
Develop 4th to 5th generation rule sets for coalition integration	1	2019	4	2020
Evaluate and assess commercial and government off-the-shelf cross domain solution devices	1	2019	2	2020
Perform accreditation for cross domain solution rule sets	2	2020	3	2022
Develop rule sets for routine LVC environment integration	2	2020	2	2022
Continue to develop CDS rule sets	1	2019	1	2020
Integrate scenarios and syllabi across DMO environments	1	2019	1	2019
Develop metrics for routine proficiency evaluations and determine standard format for storing/analyzing proficiency data	1	2019	2	2021
Create and evaluate alternative data formats for routinely tracking and storing performance and proficiency data	3	2019	3	2021
Refine learning managed scenario and integrate with live, virtual, constructive events	3	2019	4	2023
Validate training environment credibility assessments for an identified set of Air Combat Command Virtual and Constructive Environments	3	2019	3	2020
Develop and integrate After Action Review tools for Mission Training Centers	1	2020	2	2025
Develop metrics and tools to measure training proficiency gained during LVC events / standardize implementation at Distributed Training Centers (DTCs)	2	2019	4	2022
Integrate 5th generation systems into DMO network	1	2020	4	2022
Conduct interoperability studies to evaluate the training value of fifth generation interoperable coalition training on the CAF DMO network	1	2020	4	2022
Develop joint and coalition data standards and evaluate data management methods to support live, virtual, and constructive events	1	2020	4	2024

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0207701F / Full Combat Mission Training	<b>Project (Number/Name)</b> 655012 / Full Combat Mission Training
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<b>Events by Sub Project</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
Evaluation of the integration of different data management and tracking methods to support large scale, secure and persistent Joint and Coalition LVC events.	2	2019	3	2020
Demonstrate persistent performance measurement and readiness assessment in fourth to fifth generation LVC events	3	2020	2	2025
Evaluate network architectures and typologies for distributed secure LVC events	1	2019	2	2020
Develop gateways and cross domain solutions to integrate high-fidelity trainers with Air Force, joint, and coalition networks	3	2020	1	2024
Evaluate compressed DIS network standards for CDS in DMO	1	2019	3	2024
Integrate and evaluate multi-domain operations and kill-chain training scenarios for contested environments	3	2020	2	2024
Evaluate multi-national mission planning and debrief technologies in research training events	4	2020	4	2024
Implement, evaluate, and field technologies aligned with future training strategies for LVC	2	2020	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303267F / <i>Auctioned Spectrum Relocation Fund</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	44.652	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	44.652
658062: <i>Auctioned Spectrum Relocation Fund</i>	-	44.652	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	44.652
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Funding supports Spectrum relocation and sharing activities.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

**B. Program Change Summary (\$ in Millions)**

	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	44.652	0.000	0.000	0.000	0.000
Total Adjustments	44.652	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	44.652	0.000	0.000	0.000	0.000

**Change Summary Explanation**

Receive funds during execution year through a transfer from OMB

**C. Accomplishments/Planned Programs (\$ in Millions)**

	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
<b>Title:</b> Auctioned Spectrum Relocation Fund	44.652	0.000	0.000	0.000	0.000
<b>Description:</b> Funding supports Spectrum relocation and sharing activities					

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303267F / <i>Auctioned Spectrum Relocation Fund</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<b><i>FY 2020 Plans:</i></b> N/A					
<b><i>FY 2021 Base Plans:</i></b> No FY20 Funding requested in PB.					
<b><i>FY 2021 OCO Plans:</i></b> No FY21 Funding requested in PB.					
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> No FY20 or FY21 funding requested in PB.					
<b>Accomplishments/Planned Programs Subtotals</b>	44.652	0.000	0.000	0.000	0.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

Funding supports Spectrum relocation and sharing activities.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0303267F / <i>Auctioned Spectrum Relocation Fund</i>	<b>Project (Number/Name)</b> 658062 / <i>Auctioned Spectrum Relocation Fund</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Auctioned Spectrum Relocation Fund</i></b>	
Support spectrum relocation activities	████████████████████

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0303267F / <i>Auctioned Spectrum Relocation Fund</i>	<b>Project (Number/Name)</b> 658062 / <i>Auctioned Spectrum Relocation Fund</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Auctioned Spectrum Relocation Fund</i></b>				
Support spectrum relocation activities	1	2019	1	2019

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305176F / <i>Combat Survivor Evader Locator</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	0.973	0.000	0.973	0.000	0.000	0.000	0.000	Continuing	Continuing
654522: <i>CSAR EMD</i>	-	0.000	0.000	0.973	0.000	0.973	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Combat Survivor Evader Locator (CSEL) System provides aircrews with end-to-end global satellite secure emergency communication capability during combat and peace-time flying operations. CSEL provides a hand held radio as part of the mandatory aircrew survival gear. CSEL is a joint program (AF, Army, and Navy) and is the DoD program of record for personnel recovery survival radios. CSEL supports four of five Personnel Mission Phases: Report, Locate, Support, and Recover.

A National Security Agency (NSA) Cryptographic Modernization mandate and the Ultra High Frequency Follow-On satellite constellation are at the end of life and are driving upgrades to base stations. This effort includes development to modernize the system to integrate common waveforms, integrate broadcast reception for non-CSEL devices, provide for cryptographic modernization, leverage software defined capabilities based on the FY16 cryptographic study, and to procure intellectual property. CSEL will leverage software defined capabilities to replace the legacy handheld radio with a new device that supports report, locate, and recovery missions. The new device will leverage technological advancements and efficiencies to develop a more intuitive device that enables secure communication between the joint warfighter and rescue support teams. This funding will also be used to perform various studies and analysis in support of the CSEL Enterprise.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver CSEL capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

In FY2018, PE 0305176F, Combat Survivor Evader Locator efforts were transferred to PE 1203176F, Combat Survivor Evader Locator, due to the creation of a new Major Force Program (MFP) for Space programs. In FY2021, CSEL efforts were transferred back to PE 0305176F to more closely align the program's efforts with a more applicable MFP.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305176F / <i>Combat Survivor Evader Locator</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	0.973	0.000	0.973
Total Adjustments	0.000	0.000	0.973	0.000	0.973
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.973	0.000	0.973

**Change Summary Explanation**

Funding for FY2018, FY2019, and FY2020 ONLY is aligned under APP3600, BA 05, PE C3176F.

Funding for FY2021 and out is aligned under APP3600, BA 05, PE 0306176F.

Funding from FY2019 to FY2020 (ref: APP3600, BA 05, PE C3176F) is increased by \$1.07M. The increased amount will fund NGCA, and begin development for SHIELD.

Funding from FY2020 to FY2021 is reduced by \$1.03M (ref: APP3600, BA 05, PE 0306176F). This change is driven by nearing the completion of NGCA, and continued development needs of SHIELD.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / <i>KC-46A Tanker Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	132.231	0.000	0.000	106.262	0.000	106.262	108.598	66.553	39.830	0.000	0.000	453.474
651120: <i>Pegasus Capability Improvements</i>	0.000	0.000	0.000	18.060	0.000	18.060	22.435	25.216	19.077	0.000	0.000	84.788
655271: <i>KC-46 RDT&amp;E</i>	132.231	0.000	0.000	88.202	0.000	88.202	86.163	41.337	20.753	0.000	0.000	368.686

**Program MDAP/MAIS Code:** 387

**Note**

In FY2021, PE 0605221F KC-46, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements efforts were transferred to PE 401221F, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements in order to consolidate all KC-46 activity under a single PE. PE 0401221F also has historical Tanker Replacement costs from FY 2005-2008 reflected in prior years. PE 0605221F has costs from FY2009 to FY2020.

**A. Mission Description and Budget Item Justification**

Replacement of the legacy tanker fleet will take place in several stages. The initial tanker replacement increment of KC-46s will replace roughly a third of the current capability. Future programs will ultimately recapitalize the entire tanker fleet over a period of more than 30 years. The Air Force completed an Analysis of Alternatives (AoA) in Apr 2006 to determine the most appropriate strategy to recapitalize the aging fleet of aerial refueling aircraft. Based on this analysis, the Air Force concluded a strategy of full and open competition to select a commercial derivative replacement tanker aircraft would result in a best value tanker contract. To initiate the first phase of the tanker replacement, the KC-46 program released a final Request for Proposal (RFP) on 24 Feb 2010, and entered source selection on 9 Jul 2010. The KC-46 program held a Milestone B (MS B) Defense Acquisition Board (DAB) on 23 Feb 2011, received approval to enter Engineering and Manufacturing Development (EMD) from the Undersecretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)) on 24 Feb 2011, and awarded the KC-46 EMD contract to Boeing on 24 Feb 2011 to develop and procure 179 KC-46 aircraft. The program is procuring four RDT&E aircraft for integration and demonstration of capability which will ultimately be operationally fielded. During production, the program plans to procure 175 aircraft throughout 13 lots. The KC-46 program held a MS C DAB on 12 Aug 2016 and received approval to enter Low Rate Initial Production (LRIP). The program awarded LRIP Lots 1 and 2 on 18 Aug 2016, LRIP Lot 3 on 27 Jan 2017, LRIP Lot 4 on 10 Sep 2018, and LRIP Lot 5 on 27 Sep 2019. Lot 6 award is planned for May 2020, and will bring the total number of aircraft on contract to 79. The Air Force delivered the first KC-46 to McConnell Air Force Base on 25 Jan 2019. As of 10 Jan 2020, 30 aircraft have been delivered to the Air Force. KC-46 funding also supports Training Systems, Direct Mission Support, Program Management Administration (PMA) activities, government developmental and operational test support, mission planning capability development, various studies and analyses, KC-46 requirements definition and demonstrations in support of Air Force Advanced Battle Management (ABMS) initiative, engineering changes, and future tanker replacement planning activities.

The KC-46 will provide the capability to fuel joint and coalition receivers via a boom or drogue system on every mission and will also augment the airlift fleet with cargo, passenger, and aeromedical evacuation capabilities. The KC-46 will operate in day/night and adverse weather conditions to enable deployment, employment, sustainment, and redeployment of U.S. joint, allied, and coalition forces. The KC-46 will have communication, navigation, and surveillance equipment for worldwide

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / <i>KC-46A Tanker Squadrons</i>
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operations; the capability to perform missions in chemical and biological environments; the ability to operate in up to medium threat environments with self-defense/ protection (both active and passive) capabilities; and the necessary battlespace awareness to mitigate survivability threats.

The Aircrew Training System (ATS) and the Maintenance Training System (MTS) are being developed and procured using KC-46 funding. The ATS contract was awarded on 1 May 2013 to FlightSafety Services Corporation. The ATS contract will provide Aircrew Training Devices (ATDs), to include Weapon System Trainers (WSTs), Boom Operator Trainers (BOTs), Fuselage Trainers (FuTs), and Part-Task Trainers (PTTs) at each Main Operating Base (MOB) and the Formal Training Unit (FTU). The ATS contract will also support Distributed Mission Operations (DMO), provide aircrew instruction, develop courseware, provide logistics support, acquire a technical data package to support future competition efforts, and manage training device concurrency with the aircraft.

The MTS contract was awarded 6 Jul 2016 to The Boeing Company. The MTS acquisition focuses on designing, developing, testing, producing, and fielding an optimized training system for KC-46 maintainers by integrating various forms of training media and Maintenance Training Devices (MTDs) into a "blended" solution. This blended solution includes the appropriate mix of hardware and software, "high-fidelity" Augmented Hardware Training Devices (AHTDs), PTTs, Interactive Multimedia Instruction (IMI), and emerging technologies to meet validated Air Mobility Command (AMC) maintenance training requirements.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver KC-46 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	106.262	0.000	106.262
Total Adjustments	0.000	0.000	106.262	0.000	106.262
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	106.262	0.000	106.262

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / KC-46A Tanker Squadrons	<b>Project (Number/Name)</b> 651120 / Pegasus Capability Improvements
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
651120: <i>Pegasus Capability Improvements</i>	0.000	0.000	0.000	18.060	0.000	18.060	22.435	25.216	19.077	0.000	0.000	84.788
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY 2021, PE 0605221F, KC-46, efforts were transferred to PE 0401221F, KC-46, in order to consolidate all KC-46 activity under a single PE. PE 0401221F also has historical Tanker Replacement costs from FY 2005-2008. PE 0605221F has costs from FY2009 to FY2020.

**A. Mission Description and Budget Item Justification**

The KC-46 will provide the capability to fuel joint and coalition receivers via a boom or drogue system on every mission and will also augment the airlift fleet with cargo, passenger, and aeromedical evacuation capabilities. The KC-46 will operate in day/night and adverse weather conditions to enable deployment, employment, sustainment, and redeployment of U.S. joint, allied, and coalition forces. The KC-46 will have communication, navigation, and surveillance equipment for worldwide operations; the capability to perform missions in chemical and biological environments; the ability to operate in up to medium threat environments with self-defense/ protection (both active and passive) capabilities; and the necessary battlespace awareness to mitigate survivability threats.

The dynamics and mission urgency of the post-production (post-DD-250) environment require the program to maintain a flexible and responsive posture to support a broad range of mission support needs. The KC-46 will continue to identify, design, develop, integrate, verify, certify, produce, install, field, and sustain a comprehensive range of non-recurring and recurring post-production, air vehicle enhancements and field support needs. These needs may originate from programmed Mobility Air Force (MAF) requirements, Combatant Commander Joint or Urgent Operational Needs (JUON/UON), non-programmed Federal Aviation Administration (FAA) directives, requirements identified and supported by HHQ Enterprise Capability Collaboration Teams (i.e., High Value Airborne Asset [HVAA], Air Superiority 2030, and Multi-Domain Command and Control [MDC2]), or correction of field deficiencies.

The KC-46 will continue to develop, field, and sustain warfighter capabilities to meet evolving threats and mission support requirements through Block or discrete modification or modernization programs depending on mission urgency, available funding, and programmatic and technical risks. Post-production requirements can include, but will not be limited to: avionics and structural systems/ architecture and subsystem updates, general mission equipment updates and procurement, general sustainment support, studies and analyses, future Tanker requirements simulation and training, and correction of field deficiencies.

BPAC 651120 funding will also support Program Management Administration (PMA) activities, test support, mission planning capability development and various studies and analyses.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver KC-46 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / KC-46A Tanker Squadrons	<b>Project (Number/Name)</b> 651120 / Pegasus Capability Improvements		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> KC-46A Block 1 Pegasus Advanced Communications Suite (PACS)</p> <p><b>Description:</b> The KC-46A Block 1 Pegasus Advanced Communications Suite (PACS) program will satisfy Department of Defense (DoD), National Security Agency (NSA), Department of Transportation (DoT), and USAF mandates by upgrading legacy Tactical Data Link 16, Beyond Line-of-Sight (BLOS) Ultra High Frequency (UHF) Line-of-Sight (LOS) capabilities with next-generation Link 16 terminals and UHF secure, global, BLOS and anti-jam LOS satellite voice communications capabilities for the KC-46 weapon system. PACS enables compatibility and interoperability with current and planned future joint and allied forces while simultaneously increasing the survivability of secure global voice and data communications capabilities between Mobility Air Force (MAF) C2 agencies and MAF aircraft operating worldwide in or near contested environments.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> Planned Contract Award of Block 1 PACS EMD program for first 12 months of effort.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased in FY21 due to transfer of efforts from PE 0605221F, KC-46 to PE 0401221F, KC-46 in order to consolidate all KC-46 activity under a single PE.</p>		0.000	0.000	16.474
<p><b>Title:</b> KC-46 Mod Test &amp; Evaluation</p> <p><b>Description:</b> Test &amp; Evaluation (T&amp;E) activities will be conducted for Receiver Certification as a follow on to the ACAT I program.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> Planned funding for Receiver Certifications follow-on to ACAT I program.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased in FY21 due to transfer of efforts from PE 0605221F, KC-46 to PE 0401221F, KC-46 in order to consolidate all KC-46 activity under a single PE.</p>		0.000	0.000	1.000
<p><b>Title:</b> Support</p> <p><b>Description:</b> Studies and analysis to support planning activities for future initiatives for upgrades, future tanker replacement planning, and miscellaneous Program Office support and planning. Also includes requirements such as travel and training.</p> <p><b>FY 2020 Plans:</b></p>		0.000	0.000	0.586

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / KC-46A Tanker Squadrons	<b>Project (Number/Name)</b> 651120 / Pegasus Capability Improvements
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
N/A			
<b>FY 2021 Plans:</b> Planned funding for Program Office Support and planning.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased in FY21 due to transfer of efforts from PE 0605221F, KC-46 to PE 0401221F, KC-46 in order to consolidate all KC-46 activity under a single PE.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	18.060

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 05 41221F/ KC046A: KC-46A Tanker	-	-	24.085	-	24.085	70.189	56.652	-	-	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

The KC-46 Post-Production Change Management (PPCM) construct is comprised of processes and tools, specifically tailored to a broad spectrum of post-production requirements to support the KC-46 enterprise (e.g. weapon system, sustainability, training devices). PPCM is designed to leverage competition when applicable and emphasize configuration management and discrete cost accounting methodologies. KC-46 PPCM oversight will promote competition throughout the life cycle of the KC-46A fleet. All KC-46 post-production requirements and associated acquisition strategies will be carefully managed, reviewed, and approved at the appropriate levels by the KC-46 Division and/or Tanker Directorate senior functional leaders. PPCM requirements will employ multiple contract-types, tailored to the requirement and documented in discrete Acquisition Strategy Panel briefings, to minimize cost, technical, and schedule execution risks and ensure on-time deliverables. In addition, all ACAT-level programs, deriving from the PPCM process, will follow Department of Defense (DoD) Directive 5000.01 and DoD Instruction 5000.02 guidelines and directives, as applicable, to ensure management controls--commensurate with the scope and cost of the supported requirement.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / KC-46A Tanker Squadrons	<b>Project (Number/Name)</b> 651120 / Pegasus Capability Improvements
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A Capability Upgrades (to include modification and modernization)	SS/CPFF	The Boeing Company : Seattle, WA	0.000	-		-		16.474	Dec 2020	-		16.474	Continuing	Continuing	-
<b>Subtotal</b>			0.000	-		-		16.474		-		16.474	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	Various	Various : Various	0.000	-		-		1.000	Jan 2021	-		1.000	Continuing	Continuing	-
<b>Subtotal</b>			0.000	-		-		1.000		-		1.000	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration Activities	Various	KC-46 Program Office : Dayton, W-P AFB, OH	0.000	-		-		0.586	Oct 2020	-		0.586	Continuing	Continuing	-
<b>Subtotal</b>			0.000	-		-		0.586		-		0.586	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		0.000	-	0.000	18.060	-	18.060	Continuing	Continuing	N/A

**Remarks**  
In FY21, all KC-46 costs were transferred to PE 0401221F in order to consolidate all KC-46 activity under a single PE. For all costs in FY19 and FY20, refer to PE 0605221F.



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / <i>KC-46A Tanker Squadrons</i>	<b>Project (Number/Name)</b> 651120 / <i>Pegasus Capability Improvements</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Pegasus Capability Improvements</i></b>	
KC-46A Block I PACS	[REDACTED]

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / <i>KC-46A Tanker Squadrons</i>	<b>Project (Number/Name)</b> 651120 / <i>Pegasus Capability Improvements</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Pegasus Capability Improvements</i></b>				
KC-46A Block I PACS	1	2021	2	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 0401221F / KC-46A Tanker Squadrons				<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
655271: KC-46 RDT&E	132.231	0.000	0.000	88.202	0.000	88.202	86.163	41.337	20.753	0.000	0.000	368.686
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY2021, PE 0605221F KC-46, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements efforts were transferred to PE 401221F, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements in order to consolidate all KC-46 activity under a single PE. PE 0401221F also has historical Tanker Replacement costs from FY 2005-2008 reflected in prior years. PE 0605221F has costs from FY2009 to FY2020.

**A. Mission Description and Budget Item Justification**

Replacement of the legacy tanker fleet will take place in several stages. The initial tanker replacement increment of KC-46s will replace roughly a third of the current capability. Future programs will ultimately recapitalize the entire tanker fleet over a period of more than 30 years. The Air Force completed an Analysis of Alternatives (AoA) in Apr 2006 to determine the most appropriate strategy to recapitalize the aging fleet of aerial refueling aircraft. Based on this analysis, the Air Force concluded a strategy of full and open competition to select a commercial derivative replacement tanker aircraft would result in a best value tanker contract. To initiate the first phase of the tanker replacement, the KC-46 program released a final Request for Proposal (RFP) on 24 Feb 2010, and entered source selection on 9 Jul 2010. The KC-46 program held a Milestone B (MS B) Defense Acquisition Board (DAB) on 23 Feb 2011, received approval to enter Engineering and Manufacturing Development (EMD) from the Undersecretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)) on 24 Feb 2011, and awarded the KC-46 EMD contract to Boeing on 24 Feb 2011 to develop and procure 179 KC-46 aircraft. The program is procuring four RDT&E aircraft for integration and demonstration of capability which will ultimately be operationally fielded. During production, the program plans to procure 175 aircraft throughout 13 lots. The KC-46 program held a MS C DAB on 12 Aug 2016 and received approval to enter Low Rate Initial Production (LRIP). The program awarded LRIP Lots 1 and 2 on 18 Aug 2016, LRIP Lot 3 on 27 Jan 2017, LRIP Lot 4 on 10 Sep 2018, and LRIP Lot 5 on 27 Sep 2019. Lot 6 award is planned for May 2020, and will bring the total number of aircraft on contract to 79. The Air Force delivered the first KC-46 to McConnell Air Force Base on 25 Jan 2019. As of 10 Jan 2020, 30 aircraft have been delivered to the Air Force. KC-46 funding also supports Training Systems, Direct Mission Support, Program Management Administration (PMA) activities, government developmental and operational test support, mission planning capability development, various studies and analyses, engineering changes, and future tanker replacement planning activities.

The KC-46 will provide the capability to fuel joint and coalition receivers via a boom or drogue system on every mission and will also augment the airlift fleet with cargo, passenger, and aeromedical evacuation capabilities. The KC-46 will operate in day/night and adverse weather conditions to enable deployment, employment, sustainment, and redeployment of U.S. joint, allied, and coalition forces. The KC-46 will have communication, navigation, and surveillance equipment for worldwide operations; the capability to perform missions in chemical and biological environments; the ability to operate in up to medium threat environments with self-defense/protection (both active and passive) capabilities; and the necessary battlespace awareness to mitigate survivability threats.

The Aircrew Training System (ATS) and the Maintenance Training System (MTS) are being developed and procured using KC-46 funding. The ATS contract was awarded on 1 May 2013 to FlightSafety Services Corporation. The ATS contract will provide Aircrew Training Devices (ATDs), to include Weapon System Trainers (WSTs), Boom Operator Trainers (BOTs), Fuselage Trainers (FuTs), and Part-Task Trainers (PTTs) at each Main Operating Base (MOB) and the Formal Training Unit

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / KC-46A Tanker Squadrons	<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E
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(FTU). The ATS contract will also support Distributed Mission Operations (DMO), provide aircrew instruction, develop courseware, provide logistics support, acquire a technical data package to support future competition efforts, and manage training device concurrency with the aircraft.

The MTS contract was awarded 6 Jul 2016 to The Boeing Company. The MTS acquisition focuses on designing, developing, testing, producing, and fielding an optimized training system for KC-46 maintainers by integrating various forms of training media and Maintenance Training Devices (MTDs) into a "blended" solution. This blended solution includes the appropriate mix of hardware and software, "high-fidelity" Augmented Hardware Training Devices (AHTDs), PTTs, Interactive Multimedia Instruction (IMI), and emerging technologies to meet validated Air Mobility Command (AMC) maintenance training requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver KC-46 weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<p><b>Title:</b> KC-46 Aircraft Product Development</p> <p><b>Description:</b> EMD activities will be conducted to include the following types of activities: develop a commercial 767-2C aircraft upon which the KC-46 is based; develop the KC-46 military capability and integrate it into the aircraft; build four EMD aircraft; procure live fire assets; procure required Government Furnished Equipment (GFE); procure simulator and maintenance data; develop technical manuals and Type 1 training; and conduct development and operational testing.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> Continue product refinement, studies, ground, and flight testing in support of the KC-46 weapon system to include receiver certifications, simulator data collection, and completion of IOT&amp;E events/reporting. Continue execution of boom telescope actuator redesign (BTAR) Engineering Change Proposal (ECP) and support other government costs associated with solution for Remote Vision System (RVS). Study, analyze, test and update documentation in order to certify and increase KC-46 capability for aerial refueling (AR) onload.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased from FY20 to FY21 by \$46M for BTAR effort. First year of funding in this PE, previous funding in PE 0605221F.</p>	-	0.000	76.005
<p><b>Title:</b> KC-46 Test &amp; Evaluation</p> <p><b>Description:</b> Test &amp; Evaluation (T&amp;E) activities will be conducted to include the following types of activities: Development Test &amp; Evaluation, Operational Test &amp; Evaluation, Tanker Qualification, Receiver Certifications, Live Fire Test &amp; Evaluation (LFT&amp;E), Federal Aviation Administration (FAA) support, and other test planning and organizational support.</p> <p><b>FY 2020 Plans:</b></p>	-	0.000	10.997

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / KC-46A Tanker Squadrons	<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
N/A			
<p><b>FY 2021 Plans:</b> Continue using EMD, pre-delivery production, and/or LRIP aircraft to support AR tanker-receiver certification testing, Aerial Refueling Simulator Qualifications data collection, correction of deficiencies, and other T&amp;E activities for the KC-46. Continue RVS Government Test/Wing Aerial Refueling Pod (WARP) testing.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased from FY20 to FY21 by \$.1M as Receiver Certification and RVS testing efforts continue. First year of funding in this PE, previous funding in PE 0605221F.</p>			
<p><b>Title:</b> KC-46 Support</p> <p><b>Description:</b> Development, integration, and demonstration of the KC-46 mission planning capability. In addition, studies and analysis to support planning activities for future efficiency initiatives, business case analyses, future tanker replacement planning, and miscellaneous Program Office support and planning. Also includes requirements such as travel, office supplies, training courses, and service contracts.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> Continue Program Office Support and Planning.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreased from FY20 to FY21 by \$3.6M as majority of KC-46 support efforts have shifted to Production funding. First year of funding in this PE, previous funding in PE 0605221F.</p>	-	0.000	1.200
<b>Accomplishments/Planned Programs Subtotals</b>	-	0.000	88.202

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 02 Line Item KC046A: KC-46A Tanker	-	-	2,850.151	-	2,850.151	2,249.778	2,401.584	2,962.308	2,837.685	Continuing	Continuing
• APAF 06 Line Item 000999: Initial Spares	-	-	194.189	-	194.189	230.095	216.312	239.170	243.542	Continuing	Continuing

**Remarks**

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / <i>KC-46A Tanker Squadrons</i>	<b>Project (Number/Name)</b> 655271 / <i>KC-46 RDT&amp;E</i>
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**D. Acquisition Strategy**

The KC-46 Program acquisition strategy is to procure an existing commercial, FAA certified aircraft modified to meet USAF requirements. The KC-46 program released a final RFP on 24 Feb 2010, and entered source selection on 9 Jul 2010. The KC-46 program held a MS B DAB on 23 Feb 2011, received approval to enter EMD from the USD(AT&L) on 24 Feb 2011, and awarded the KC-46 contract to Boeing on 24 Feb 2011 to develop and procure 179 KC-46 aircraft. The KC-46 contract procurement was conducted via a full and open competition per Federal Acquisition Regulation (FAR) Part 15, and resulted in a FY 2011 EMD Fixed Price Incentive Firm (FPIF) contract. The EMD phase is developing, building, and testing four KC-46 aircraft, and will qualify the KC-46 as a tanker and certify pairings with receiver aircraft.

The MS B acquisition strategy planned for two LRIP lots followed by 11 Full Rate Production (FRP) lots for a total aircraft procurement of 175 production aircraft. Updates to the acquisition strategy occurred in support of Milestone C (MS C) that increased LRIP from two to five lots and the remaining eight to be FRP lots with the total aircraft buy remaining at 175 Production aircraft (+4 EMD aircraft for a grand total of 179 aircraft).

LRIP consists of two Firm Fixed Price (FFP) and three FFP Not to Exceed (NTE) options (LRIP-1 Qty 7, LRIP-2 Qty 12, LRIP-3 Qty 15, LRIP-4 Qty 18, and LRIP-5 Qty 15). This will be followed by eight (Lots 6-13) FFP production options [via NTE values + Economic Price Adjustment (EPA)]. LRIP Lots 1 and 2 were awarded on 18 Aug 2016, LRIP Lot 3 was awarded on 27 Jan 2017, LRIP Lot 4 was awarded on 10 Sep 2018 and LRIP Lot 5 was awarded on 27 Sep 2019.

The ATS acquisition strategy is to provide ATDs, and associated support structure, to each MOB and the FTU. The ATS EMD FPIF contract with production options was conducted via a full and open competition per FAR Part 15, and awarded to FlightSafety Services Corporation in FY 2013. The ATS EMD phase will develop and procure ATDs; and will be supported with courseware, Training System Support Center, the technical data package, and support equipment to ensure system availability and concurrency with the aircraft. The first three ATS production options were exercised on 19 Aug 2015, 31 May 2017, and 30 Apr 2018.

The MTS acquisition strategy is to acquire MTDs, and associated support structure, for two AMC active duty Regional Maintenance Training Facilities. The MTS EMD FFP contract with production options was conducted via a full and open competition per FAR Part 15, and awarded to The Boeing Company in FY 2016. The MTS EMD phase will develop and procure MTDs; and will be supported with courseware, Training System Support Center, the technical data package, and support equipment to ensure system availability and concurrency with the aircraft.

The KC-46 Program is responsible for the development, testing, and production of a drogue-equipped, wing-mounted refueling system to meet Capability Production Document (CPD) thresholds and objectives for simultaneous refueling of two probe-equipped receivers. The system can be installed or removed from the KC-46 as mission needs dictate.

The long-term support concept for the KC-46 is organic two-level maintenance (2LM): organization level (O-level) and depot level (D-level). For the purposes of this program, all maintenance other than O-level shall be referred to as D-level. The product support strategy will initially employ Interim Contractor Support (ICS) before transitioning to a 100% organically-managed maintenance and supply support capability. Performance Based Logistics (PBL) solutions will be evaluated during EMD as viable approaches to facilitate the transition.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / KC-46A Tanker Squadrons	<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A aircraft non-recurring development, integration, and testing; 4 RDT&E tanker aircraft; and support	C/FPIF	The Boeing Company : Seattle, WA	0.000	-		-		76.005	Apr 2021	-		76.005	Continuing	Continuing	5,053.500
<b>Subtotal</b>			0.000	-		-		76.005		-		76.005	Continuing	Continuing	N/A

**Remarks**  
The KC-46 EMD contract was awarded 24 Feb 2011. The total cost represents the current Program Office Estimate (POE) which accounts for the ceiling price of the contract plus the financial and schedule risk of potential design changes for the KC-46 aircraft.

FINANCIAL PERFORMANCE: The KC-46 is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, the KC-46 EMD contract is a FPIF contract with progress payments. Twenty percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A testing and planning support of development & operational test, FAA & military certification, and aircraft qualification activities	Various	Various : Various	0.000	-		-		10.997	Mar 2021	-		10.997	Continuing	Continuing	-
<b>Subtotal</b>			0.000	-		-		10.997		-		10.997	Continuing	Continuing	N/A

**Remarks**  
Integrated testing and planning activities are performed by government organizations, with some contractor technical subject matter experts and teaming with the prime contractor.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / KC-46A Tanker Squadrons	<b>Project (Number/Name)</b> 655271 / KC-46 RDT&E
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A Program Management Administration - Other	Various	KC-46 Program Office : Dayton, W-P AFB, OH	132.231	-		-		1.200	Oct 2020	-		1.200	0.000	133.431	-
<b>Subtotal</b>			132.231	-		-		1.200		-		1.200	0.000	133.431	N/A

**Remarks**  
Other PMA funding includes, but is not limited to, travel, supplies, and training.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	132.231	-	0.000	88.202	-	88.202	Continuing	Continuing	N/A

**Remarks**  
In FY2021, PE 0605221F KC-46, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements efforts were transferred to PE 401221F, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements in order to consolidate all KC-46 activity under a single PE. PE 0401221F also has historical Tanker Replacement costs from FY 2005-2008 reflected in prior years. PE 0605221F has costs from FY2009 to FY2020.





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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401221F / <i>KC-46A Tanker Squadrons</i>	<b>Project (Number/Name)</b> 655271 / <i>KC-46 RDT&amp;E</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>KC-46</b>				
Initial Operational Test & Evaluation (WARPs)	1	2021	2	2021
Government Testing for Correction of Deficiencies	1	2021	4	2024
Boom Telescope Actuator Redesign ECP	1	2021	4	2023
Aircrew Training System Development & Updates	1	2021	4	2023

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0401310F / <i>C-32 Executive Transport Recapitalization</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	5.989	9.930	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
654019: <i>C-32 Executive Transport Recap</i>	-	5.989	9.930	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Note: FY18 Prior Year Funding of \$2.918M was executed in PE 0401310F, BPAC 654019, BA05

The C-32A mission is to provide Executive Airlift transportation for the First Lady, Vice President, Cabinet, Congress, and foreign Heads of State. The C-32A also serves as the backup to the VC-25 Presidential support aircraft.

The C-32 Executive Transport Recapitalization program will replace the aging C-32A aircraft fleet. The Air Force and Navy are engaged in an effort to recapitalize the National Military Command System fixed-wing aircraft and large capacity Executive Airlift fleets. The aircraft consist of the Air Force E-4B National Airborne Operations Center (NAOC), Air Force C-32A Executive Airlift (EA), and the Navy E-6B Airborne Command Post (ABNCP) and Take Charge and Move Out (TACAMO) aircraft. These platforms are aging and increasingly difficult to support. The combined effort will explore the realignment of missions among platforms and examine the potential benefits of acquiring common airframes without sacrificing operational effectiveness or increasing overall costs. This is being conducted through the NEAT (N=NAOC, E=EA, A= ABNCP, T=TACAMO) Analysis of Alternatives (AoA).

This budget supports funding to complete a joint service AoA in collaboration with the E-4B and E-6B Recapitalization programs to explore commonality of the airframe and interoperability of the mission equipment. Funding continues establishment of the Program Office and matures the development of the acquisition strategy. Funding also supports cost/performance trade studies and risk reduction activities.

Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortage (DMSMS) issues.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver C-32A weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is currently programmed in Budget Activity (BA) 5. However, the program is in the Materiel Solution Analysis Phase conducting an AoA. Post AoA Materiel Development Decisions (MDD), to determine acquisition milestone entry point for one or more follow-on Acquisitions, is projected in 2Q FY20. The program is Pre-Milestone B and is not conducting Engineering and Manufacturing Development (EMD). [Note: The following statement is system generated due to being in BA5 and cannot be omitted at this time.]

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)	<b>R-1 Program Element (Number/Name)</b> PE 0401310F I C-32 Executive Transport Recapitalization
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This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	7.943	9.930	9.926	0.000	9.926
Current President's Budget	5.989	9.930	0.000	0.000	0.000
Total Adjustments	-1.954	0.000	-9.926	0.000	-9.926
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-1.954	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-9.926	0.000	-9.926

**Change Summary Explanation**

FY 2019 funding reduced to account for the availability of prior year execution balances.

In FY 2021, PE 0401310F, C-32 Executive Transport Recapitalization, Project 654019, C-32 Executive Transport Recap efforts were transferred to PE 0401310F, C-32 Executive Transport Recapitalization, Project 640009, in order to reflect the appropriate budget activity for these funds.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> C-32 Executive Transport Recapitalization Analysis of Alternatives	4.000	7.000	0.000
<b>Description:</b> Continue AoA activities to assess potential materiel solutions and inform the Material Development Decision (MDD) to mitigate current capability gaps.			
<b>FY 2020 Plans:</b> Funds in FY20 completed the AoA, supported the Material Development Decision (MDD) and began material solution analysis activities.			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0401310F / <i>C-32 Executive Transport Recapitalization</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Funding was transferred to BA04 within PE 0401310F.			
<b>Title:</b> C-32 Executive Transport Recapitalization Program Office Standup	1.989	2.930	0.000
<b>Description:</b> Continue standup of Program Office to support AoA closeout and early acquisition activities.			
<b>FY 2020 Plans:</b> Funds in FY20 supported the Material Development Decision (MDD), Program Office support tasks, A&AS costs, travel and PMA			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding was transferred to BA04 within PE 0401310F.			
<b>Accomplishments/Planned Programs Subtotals</b>	5.989	9.930	0.000

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
The C-32A Executive Transport Recapitalization effort acquisition strategy will be fully developed after the JROC mission realignment decision and the determination of a Material Development Decision (MDD).

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401310F / C-32 Executive Transport Recapitalization	<b>Project (Number/Name)</b> 654019 / C-32 Executive Transport Recap
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
C-32 Executive Transport Recapitalization Analysis of Alternatives	MIPR	ASC/XRX : WPAFB, OH	-	4.000	Mar 2019	7.000	Mar 2020	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	4.000		7.000		-		-		-	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
C-32 Executive Transport Recapitalization: PMA Contractor Services and PMA Other Government Costs	Various	AFLCMC/WV : Dayton, OH	-	1.989	Jan 2019	2.930	Jan 2020	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	1.989		2.930		-		-		-	Continuing	Continuing	N/A

<b>Project Cost Totals</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
	-	5.989	9.930	-	-	-	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401310F / C-32 Executive Transport Recapitalization	<b>Project (Number/Name)</b> 654019 / C-32 Executive Transport Recap

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>C-32 Recap</b>																												
Program Office Standup																												
AoA Study Planning																												
RFI Event #2																												
Mission Realignment Review																												
AoA																												
Acquisition Strategy Development																												
Post AoA MDD																												
Staff Report																												
JROC Mission Realignment Report																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401310F / C-32 Executive Transport Recapitalization	<b>Project (Number/Name)</b> 654019 / C-32 Executive Transport Recap

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>C-32 Recap</b>				
Program Office Standup	1	2019	4	2020
AoA Study Planning	1	2019	2	2019
RFI Event #2	1	2019	2	2019
Mission Realignment Review	2	2019	3	2020
AoA	1	2019	3	2020
Acquisition Strategy Development	2	2020	4	2020
Post AoA MDD	3	2020	4	2020
Staff Report	3	2020	4	2020
JROC Mission Realignment Report	3	2020	4	2020



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0401319F / VC-25B
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	1,026.868	713.633	757.923	800.889	0.000	800.889	584.585	513.587	308.076	16.149	0.000	4,721.710
655250: VC-25B	1,026.868	713.633	757.923	800.889	0.000	800.889	584.585	513.587	308.076	16.149	0.000	4,721.710
Quantity of RDT&E Articles	2	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 425

**Note**

FY10-14 Prior Years Funding \$27.29M was executed in PE 0401314F, BPAC 675355

**A. Mission Description and Budget Item Justification**

The VC-25B Program, formerly known as the Presidential Aircraft Recapitalization (PAR) Program, will replace the Presidential VC-25A fleet which faces capability gaps, rising maintenance costs, and parts obsolescence as it ages beyond 30 years. The VC-25B Program Office will deliver a new fleet of aircraft to meet the requirements for the President to execute the duties of Head of State, Chief Executive, and Commander-in-Chief. The VC-25B Program will uniquely modify two Boeing 747-8 commercial aircraft to provide the President, staff, and guests with safe and reliable air transportation with the equivalent level of communications capability and security available in the White House. The modifications to the 747-8 aircraft will include an electrical power upgrade with dual Auxiliary Power Units that are usable in flight, a mission communication system, a work and rest environment, an executive interior, military avionics, a self-defense system, autonomous enplaning and deplaning, and autonomous baggage loading. No significant changes to the existing VC-25A Concept of Operations or Concept of Employment are expected.

In August 2012, the Defense Acquisition Executive (DAE), as the VC-25B Milestone Decision Authority, approved the Materiel Development Decision. The Capability Development Document (CDD) was validated by the Joint Requirements Oversight Council in November 2014. In January 2015, the Secretary of the Air Force's Determination and Findings designated the Boeing 747-8 aircraft as the airframe platform, and the DAE's Acquisition Decision Memorandum authorized Pre-Milestone B (Pre-MS B) contracts aimed at improving affordability and reducing program execution risk. In February 2015, the Assistant Secretary of the Air Force for Acquisition approved a Justification and Approval designating Boeing as the sole source for Pre-MS B activities; and Post-MS B design, integration, modification, and test activities. The DAE approved the initial acquisition strategy in September 2015. MS B certification occurred in September 2016. In March 2017, the White House reaffirmed the minimum set of requirements necessary to meet Presidential mission needs; these requirements are codified in the March 2017 CDD. The DAE approved the updated acquisition strategy and the Acquisition Program Baseline (APB) in December 2018.

This budget supports Post-MS B design, integration, modification, and test of two aircraft to make them Presidential mission ready. In FY19, the program completed Preliminary Design (PD) and continued the Engineering and Manufacturing Development (EMD) initial activities including design and integration. In FY20 and FY21, the program will continue EMD activities to include design, integration, modification, and test, as well as begin Product Support (PS) activities.

Funds may be used to lease test equipment, as well as address emerging and short-notice Diminishing Manufacturing Sources and Material Shortage (DMSMS) issues.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0401319F / VC-25B
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver the VC-25B system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development an Demonstration (SDD); however, it will not enter full rate production as stated below.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	657.932	757.923	718.324	0.000	718.324
Current President's Budget	713.633	757.923	800.889	0.000	800.889
Total Adjustments	55.701	0.000	82.565	0.000	82.565
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	79.300	0.000			
• SBIR/STTR Transfer	-23.599	0.000			
• Other Adjustments	0.000	0.000	82.565	0.000	82.565

**Change Summary Explanation**

The VC-25B program received FY19 reprogramming funds in the amount of \$79.3M to support the budget with the APB. An additional \$40M of reprogramming was approved in December 2019 and is not reflected in the FY19 totals throughout this document.

FY19 funding was reduced by \$23.599M due to Small Business Innovative Research (SBIR) transfer.

FY21 additional funding adjusts program phasing to align to program execution. The total cost of the program as documented in the APB remains unchanged.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> VC-25B EMD, Product Support, & Program Management Administration (PMA)  <b>Description:</b> Execute EMD activities and accomplish PMA to support the Program Office. FY21 will continue EMD activities such as the management, detailed design, integration, modification, test/verification, certification, and product support to deliver two Presidential mission-ready VC-25B Aircraft and utilize modeling and simulation, system integration labs (SILs), and mockups to assist in design, modification, and test events.	712.402	755.388	795.669

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0401319F / VC-25B
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>FY 2020 Plans:</b> Funds in FY 2020 were used to continue EMD activities, begin aircraft modification, begin product support activities, and support PMA.</p> <p><b>FY 2021 Plans:</b> Funds in FY 2021 will continue EMD activities, aircraft modification, product support activities, as well as support PMA.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The overall net increase in funding is due to the transition from design activities to the procurement of material for modification of the platform, as well as an increase in product support activities to support fielding in 2024.</p>			
<p><b>Title:</b> VC-25B Government Test</p> <p><b>Description:</b> Government test activities to prepare for, oversee, and conduct test events.</p> <p><b>FY 2020 Plans:</b> Funds in FY 2020 were used to conduct test planning with Joint Interoperability Test Command (JITC), Lead Developmental Test and Evaluation Organization (LDTO), and Facilities/Ranges; as well as participate in working groups and reviews.</p> <p><b>FY 2021 Plans:</b> Funds in FY 2021 will be used to continue test planning with participating test organizations and contractors and to participate in verification testing in SILs, contractor facilities and government facilities, as well as aircraft functional checkout.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The increase in funding is due to planned growth in the level of effort required for test plan development, test execution in SILs, test execution at contractor facilities, and aircraft functional checkout.</p>	1.231	2.535	5.220
<b>Accomplishments/Planned Programs Subtotals</b>	713.633	757.923	800.889

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• MILCON PE 0401319F: <i>PAR Facilities</i>	166.116	86.000	-	-	-	-	-	-	-	0.000	252.116
• OPAF 03 Lineitem 843050: <i>PAR Mechanized Material Handling Equip</i>	38.590	-	-	-	-	-	-	-	-	0.000	38.590

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0401319F / VC-25B
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**D. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• OPAF 03 Lineitem 8347240: <i>PAR CCTV/Audiovisual Equipment</i>	3.005	-	-	-	-	-	-	-	-	0.000	3.005
• OPAF 03 Lineitem 837300: <i>PAR Base Comm Infrastructure</i>	-	4.010	-	-	-	-	-	-	-	0.000	4.010
• OPAF 02 823990: <i>Special Purpose Vehicles</i>	-	-	0.499	-	0.499	2.598	1.697	-	-	0.000	4.794
• O&M O&M: PE 0401319F: <i>PAR Furnishings and Equipment</i>	-	-	1.951	-	1.951	-	-	-	-	0.000	1.951

**Remarks**

**E. Acquisition Strategy**

The Defense Acquisition Executive (DAE), as the VC-25B Milestone Decision Authority, approved the initial VC-25B Acquisition Strategy in September 2015. The DAE approved the updated VC-25B Acquisition Strategy and set the APB in December 2018. The VC-25B Program will integrate technologically mature subsystems into two Government furnished, commercial Boeing 747-8 aircraft. The VC-25B Program will design, integrate, modify, and test two aircraft to make them Presidential mission ready. Boeing is the prime integrator for VC-25B development activities. The VC-25B Program has a single sole-source firm-fixed-price contract with multiple major contract modifications. Modifications include risk reduction activities, 747-8 commercial aircraft purchase, Preliminary Design (PD), Engineering and Manufacturing Development (EMD), and Product Support. The contract for risk reduction activities was awarded in January 2016. The contract modification to purchase two commercial aircraft was awarded in August 2017. The contract modification for PD was awarded in September 2017. The contract modification for EMD was awarded in July 2018. The initial contract modification for Product Support activities is expected to award in the 4th quarter of 2020.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401319F / VC-25B	<b>Project (Number/Name)</b> 655250 / VC-25B
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
VC-25B Contract Activities	SS/FFP	The Boeing Company : Various	1,004.635	698.439	Oct 2018	740.364	Oct 2019	781.487	Oct 2020	-		781.487	1,287.486	4,512.411	-
<b>Subtotal</b>			1,004.635	698.439		740.364		781.487		-		781.487	1,287.486	4,512.411	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
VC-25B Developmental Test and Evaluation	MIPR	412 TW, JITC : Various	1.604	1.231	Dec 2018	2.535	Dec 2019	5.224	Dec 2020	-		5.224	56.849	67.443	-
<b>Subtotal</b>			1.604	1.231		2.535		5.224		-		5.224	56.849	67.443	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
VC-25B PMA Other Government Costs	Various	AFLCMC/WV : WPAFB, OH	7.997	10.010	Nov 2018	10.841	Nov 2019	9.881	Nov 2020	-		9.881	62.045	100.774	-
VC-25B PMA Contract Services	C/T&M	AFLCMC/WL : WPAFB, OH	12.632	3.953	Feb 2019	4.183	Feb 2020	4.297	Feb 2021	-		4.297	16.028	41.093	-
<b>Subtotal</b>			20.629	13.963		15.024		14.178		-		14.178	78.073	141.867	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	1,026.868	713.633	757.923	800.889	-	800.889	1,422.408	4,721.721	N/A

**Remarks**  
 FY 2010-2014 RDT&E Funding (\$27.3M) was executed in PE 0401314F, Project 675355, BA07.  
  
 The total program cost shown above does not reflect an approved FY19 Above Threshold Reprogramming (ATR) of \$40M.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401319F / VC-25B	<b>Project (Number/Name)</b> 655250 / VC-25B
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025																							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																				
<b>VC-25B</b>																																																
PD	■																																															
PDR	■																																															
EMD	■																																															
In-Progress Review, FY19	■																																															
CDR						■																																										
Aircraft Modification						■																																										
Product Support Activities																																																
Developmental Test (DT)																																																
Familiarization and Operational Test (FAM/OT)																																																
Required Assets Available (RAA) for Initial Operational Capability (IOC)																																																
RAA for Full Operational Capability (FOC)																																																

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0401319F / VC-25B	<b>Project (Number/Name)</b> 655250 / VC-25B
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>VC-25B</b>				
PD	1	2019	1	2019
PDR	1	2019	1	2019
EMD	1	2019	2	2025
In-Progress Review, FY19	1	2019	1	2019
CDR	2	2020	2	2020
Aircraft Modification	2	2020	2	2024
Product Support Activities	4	2020	2	2025
Developmental Test (DT)	1	2022	4	2023
Familiarization and Operational Test (FAM/OT)	3	2024	4	2024
Required Assets Available (RAA) for Initial Operational Capability (IOC)	4	2024	4	2024
RAA for Full Operational Capability (FOC)	2	2025	2	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0701212F / <i>Automated Test Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	13.153	2.787	10.673	0.000	10.673	15.506	8.018	1.528	16.504	Continuing	Continuing
6506TE: <i>Test And Evaluation Support Budget Authority</i>	-	13.153	2.787	10.673	0.000	10.673	15.506	8.018	1.528	16.504	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Program MDAP/MAIS Code:** 6506

**Note**  
 The Automatic Test System program office is responsible for developing, acquiring and sustain Automatic Test Systems for the United States Air Force (USAF).

The Bomber Armament Tester is replacing six legacy testers and combining their capabilities into one tester. The Bomber Armament Tester will support the B-2, B-1 and B-52 platforms.

The Common Aircraft Portable Reprogramming Equipment (CAPRE) is a secure common Memory Loader Verifier (MLV) that loads operational flight programs for 32 USAF weapons systems. Weapon Systems include but are not limited to A-10, B-1, B-52, C-5, C-17, C-130, CV-22, F-15, F-16, H-60 and KC-46.

**A. Mission Description and Budget Item Justification**

The Bomber Armament Tester will ensure that our USAF bomber fleet can conduct nuclear deterrence, global power projection and global strike operations to support the President of the United States and Combatant Commanders by providing a reliable, cyber secure, and sustainable tester. The tasks are to develop a common bomber armament tester and the Test Program Sets (Software, Hardware, and Documentation) to test the armament release equipment on the bombers.

RDT&E efforts support development, testing, and producibility of the Bomber Armament Tester and Test Program Sets. The program will utilize an incremental development approach with B-2 as Increment 1, B-1 as Increment 2, and B-52 as Increment 3.

The Common Aircraft Portable Reprogramming Equipment (CAPRE) Secure Memory Loader Verifier (SMLV) is a secure common memory loader verifier that loads operational flight programs to the weapon systems. . CAPRE leads the fleet on Cyber initiatives and is government owned and developed. CAPRE supports 32 USAF weapon systems including but not limited to A-10, B-1, B-52, C-5, C-17, C-130, CV-22, F-15, F-16, H-60 and KC-46.

RDT&E effort includes developing a Network Interface Module (NIM) that provides additional cyber hardening to the CAPRE system and redesigning the current CAPRE system to adapt to the NIM. RDT&E effort also includes software development for NIM interfaces and new weapons systems moving to the CAPRE system from other MLV systems. The goal is to provide one common cyber secure MLV for the Air Force that minimizes cyber vulnerabilities in weapon systems.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0701212F / <i>Automated Test Systems</i>
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The Common Armament Tester-Fighter (CAT-F) provides acquisition workforce to execute new workload associated with implementation of cyber secure common armament ATS solution resulting in significant reduction in logistics footprint, reduced sustainment cost and improved testing availability for nuclear & conventional missions. This will allow for a common reliable, cyber resilient, nuclear certified and sustainable armament tester for the USAF Combat Fighter Aircraft (A-10, F-15, F-16, F-22 and MQ-9 Platforms). Currently there are 14 unique testers supporting six fighter aircraft; 1009 total testers, \$10M annually to sustain with each tester having its own life cycle program management support structure. Availability of current testers averages 60%; legacy preload testers for A-10 & F-16 cannot check MIL-STD-1760.

RDT&E efforts support development, testing, and ability to produce the Common Armament Tester Fighter and Test Program Sets.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Automatic Test Systems Program Office weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F."

This program element also includes program administrative cost for the Automatic Test Systems program office and funds the cost of studies and research to support the Automatic Test Systems fleet.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	13.653	2.787	17.200	0.000	17.200
Current President's Budget	13.153	2.787	10.673	0.000	10.673
Total Adjustments	-0.500	0.000	-6.527	0.000	-6.527
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.500	0.000			
• Other Adjustments	0.000	0.000	-6.527	0.000	-6.527

**Change Summary Explanation**

FUNDING REDUCED AS A RESULT OF ZERO BELOW THRESHOLD (ZBT) AND UNDER EXECUTION OF FUNDING

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0701212F / <i>Automated Test Systems</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Bomber Armament Tester <b>Description:</b> New Common Bomber Armament Tester for B-1, B-2, and B-52.  <b>FY 2020 Plans:</b> No FY20 funding for Bomber Armament Tester  <b>FY 2021 Plans:</b> Increments 1-3 (B-2, B-1, B-52)  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funds need to finish the develop of the Bomber Armament Tester, Increments 1-3 (B-2, B-1, B-52)	13.153	0.000	8.284
<b>Title:</b> Common Aircraft Portable Reprogramming Equipment (CAPRE) <b>Description:</b> Development of a common cyber secure Memory Loader Verifier for the Air Force.  <b>FY 2020 Plans:</b> Development of Aircraft Adapter Group (AAG) software and cabling to re-host F-16 Viper and legacy CAPRE groups to the NIM  <b>FY 2021 Plans:</b> FY21/22 3600 RDT&E funds needed to complete the development of the CAPRE SMLV that allows secure transfer of operational flight program (OFP) on 32 supported aircraft. This includes software development and interfaces for the CAPRE SMLV.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 cut based on past execution	0.000	2.787	2.389
<b>Accomplishments/Planned Programs Subtotals</b>	13.153	2.787	10.673

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 07 00071: <i>Replacement Support Equipment</i>	18.099	13.600	27.311	0.000	27.311	27.392	23.677	19.182	23.948	0.000	153.209

**Remarks**  
 Other program funding includes procurement funds for Bomber Armament Tester Program, the Common Aircraft Portable Reprogrammable Equipment and Aircraft Smart Weapons Test Set (ASWTS).

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0701212F / <i>Automated Test Systems</i>
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**E. Acquisition Strategy**  
Acquisition Strategy for the Bomber Armament Tester (BAT) was approved by AFPEO/ Agile Combat Support on 12 November 2015 . The BAT program will use an incremental approach based on customer needs to satisfy this requirement. Increment 1 includes the development of the core test set, the B-2A requirements and development of the most complex B-1B and B-52 test program sets. Increment 2 consist of the B-1B development and Increment 3 consists of the B-52H requirements. The BAT program will utilize full and open competition to award the contract. Contract awarded September 28, 2017.

The Acquisition strategy for Common Aircraft Portable Reprogrammable Equipment (CAPRE) Secure Memory Loader Verifier. (SMLV) is to use the original government manufacturer to develop the NIM , software and hardware development. Acquisition Strategy for CAPRE was approved by the Milestone Decision Authority in June 2017.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0701212F / Automated Test Systems	<b>Project (Number/Name)</b> 6506TE / Test And Evaluation Support Budget Authority
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
CAPRE/CAPRE SMLV Development	PO	309th OO-ALC : UT	-	0.000		2.270	Oct 2019	1.872	Oct 2020	-		1.872	Continuing	Continuing	-
BAT Development	C/CPAF	Not specified. : CA	-	4.600	Apr 2019	-		6.358	Dec 2020	-		6.358	Continuing	Continuing	-
<b>Subtotal</b>			-	4.600		2.270		8.230		-		8.230	Continuing	Continuing	N/A

**Remarks**  
 Product Development Cost include the development of the Bomber Armament Test Sets ( Units under test Software, hardware and Technical Data), Technical Data and maintenance of Government Furnished Equipment.

Development efforts include developing a Network Interface Module (NIM) that provides additional cyber hardening to the CAPRE system and redesigning the current CAPRE system to adapt to the NIM. Development effort also include software development for NIM interfaces and new weapons systems moving to the CAPRE system from other MLV systems. The goal is to provide one common cyber secure MLV for the Air Force.

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	2.487	Sep 2019	-		-		-		-	Continuing	Continuing	-
Logistic Support	C/CPAF	Not specified. : NV	-	2.488	Sep 2019	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	4.975		-		-		-		-	Continuing	Continuing	N/A

**Remarks**  
 Support Cost include Independent verification and validation support, Nuclear Certification Support and Cyber Security authority support.

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		0.450	Nov 2020	-		0.450	Continuing	Continuing	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0701212F / Automated Test Systems	<b>Project (Number/Name)</b> 6506TE / Test And Evaluation Support Budget Authority
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<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Development and Operation Testing support	C/CPIF	Not specified. : NV	-	2.000	Aug 2019	-		0.108	Mar 2021	-		0.108	Continuing	Continuing	-
<b>Subtotal</b>			-	2.000		-		0.558		-		0.558	Continuing	Continuing	N/A

**Remarks**  
Environmental testing of the Bomber Armament Tester and operational testing of the test program sets for the B-2 and most complex B-1 and B-52

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		0.000	Aug 2021	-		0.000	Continuing	Continuing	-
BAT Travel	Various	Not specified. : NV	-	0.095	Sep 2019	0.000		0.100	Sep 2021	-		0.100	Continuing	Continuing	-
BAT Program Management Support	C/FFP	Not specified. : NV	-	1.268	May 2019	0.000		1.268	Sep 2021	-		1.268	Continuing	Continuing	-
CAPRE/CAPRE SMLV Travel	Various	Not specified. : NV	-	0.015	Sep 2019	0.025	Sep 2020	0.025	Sep 2021	-		0.025	Continuing	Continuing	-
CAPRE/ CAPRE SMLV Program Management Support	C/FFP	Not specified. : NV	-	0.200	May 2019	0.492	Jun 2020	0.492	Jul 2021	-		0.492	Continuing	Continuing	-
<b>Subtotal</b>			-	1.578		0.517		1.885		-		1.885	Continuing	Continuing	N/A

**Remarks**  
PMA costs include travel to support the development of the Bomber Armament Tester. PMA cost also include an Information Assurance expert, Assistance and advisory service contractors to provide support to the program office during the development of the program. The program element may include necessary civilian pay expenses required to manage, execute and deliver Automatic Test System capability.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	13.153	2.787	10.673	-	10.673	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0701212F / <i>Automated Test Systems</i>	<b>Project (Number/Name)</b> 6506TE / <i>Test And Evaluation Support Budget Authority</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Automatic Test Systems</b>																												
BAT Milestone C Decision																												
Inc 2 EMD B-1B TPS																												
Inc 3 EMD B-52 TPS																												
TPS FIAT (PCA/FCA)																												
CAPRE Block 40/50 Design Development Gates																												
CAPRE CDR																												
CAPRE Block 30 Design Development Gates																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0701212F / <i>Automated Test Systems</i>	<b>Project (Number/Name)</b> 6506TE / <i>Test And Evaluation Support Budget Authority</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Automatic Test Systems</i></b>				
BAT Milestone C Decision	2	2021	2	2021
Inc 2 EMD B-1B TPS	4	2019	3	2021
Inc 3 EMD B-52 TPS	3	2021	4	2022
TPS FIAT (PCA/FCA)	4	2020	1	2021
CAPRE Block 40/50 Design Development Gates	4	2019	2	2020
CAPRE CDR	2	2019	4	2019
CAPRE Block 30 Design Development Gates	1	2019	3	2020

**Note**  
Schedule reflects increment one EMD. Increments two and three are currently unfunded.

CAPRE is government designed and development. Plan is to have original government manufacturer to handle this development effort.



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0804772F / <i>Training Developments</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	4.479	0.000	4.479	4.550	4.636	4.724	4.815	Continuing	Continuing
652400: <i>Training Developments</i>	-	0.000	0.000	4.479	0.000	4.479	4.550	4.636	4.724	4.815	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This program, BA 5, PE 0804772F, project 652400, Pilot Training Next (PTN) Development, is a new start.

**A. Mission Description and Budget Item Justification**

Pilot Training Next (PTN) offers a more effective approach to pilot training. New training technologies will be studied and validated. Results will be used by Air Education and Training Command to develop processes and procedures to increase pilot production, improve and streamline existing training programs, and to incorporate into other programs.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver PTN weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

Alignment to the NDS: PTN is part of a complete redesign of pilot training using cutting edge technology to provide a faster, more cost effective and more comprehensive training model to get the warfighter to the cockpit in half the time of the existing model.

Funding contained in this documentation directly aids Air Education and Training Command's flying training enterprise to continue its overall Future Years Defense Program pilot production increase starting in FY 2020, thus reducing the USAF Pilot Shortage.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force				<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 0804772F / <i>Training Developments</i>				
<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	
Previous President's Budget	0.000	0.000	0.000	0.000	0.000	
Current President's Budget	0.000	0.000	4.479	0.000	4.479	
Total Adjustments	0.000	0.000	4.479	0.000	4.479	
• Congressional General Reductions	0.000	0.000				
• Congressional Directed Reductions	0.000	0.000				
• Congressional Rescissions	0.000	0.000				
• Congressional Adds	0.000	0.000				
• Congressional Directed Transfers	0.000	0.000				
• Reprogrammings	0.000	0.000				
• SBIR/STTR Transfer	0.000	0.000				
• Other Adjustments	0.000	0.000	4.479	0.000	4.479	
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>				<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Pilot Training Next (PTN) Development				0.000	0.000	4.479
<b>Description:</b> Pilot Training Next currently utilizes eight (8) T-6B aircraft equipped with heads-up and advanced situational awareness displays. Mission computers were temporarily modified to enable Air-to-Air and Air-to-Ground simulated weapons delivery. Numerous Virtual Reality (VR) Immersive Training Devices (ITDs) are also being utilized in the training curriculum. The aircraft and VR ITDs enable proper assessment of advanced pilot training concepts, techniques, procedures, and capabilities, while also providing a flexible architecture that incorporates Live, Virtual, and Constructive (LVC) elements into undergraduate pilot training.						
Efforts will be focused on validating new LVC and VR ITD concepts to develop processes and procedures to increase pilot production, improve and streamline existing undergraduate pilot training programs.						
<b>FY 2020 Plans:</b> N/A						
<b>FY 2021 Plans:</b> Continue experimentation with the T-6B aircraft configured in the Textron BP2+ software package. Begin development and prototyping of T-6A avionics modifications as it relates to real-time data capture and advanced competency instruction within PTN. Further refine VR ITD capabilities.						
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 New Start						
<b>Accomplishments/Planned Programs Subtotals</b>				0.000	0.000	4.479

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0804772F / <i>Training Developments</i>
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**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

Program Office(s) will select their own acquisition strategies based on Air Education and Training Command's innovation unit (Detachment 24) requirements. The initial systems PTN is primarily focused on are small-scale avionics modifications to the T-6A aircraft and incorporating Virtual Reality Immersive Training Devices into the undergraduate pilot training curriculum.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0804772F / Training Developments	<b>Project (Number/Name)</b> 652400 / Training Developments
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Pilot Training Next Contracts	Various	AFLCMC : TBD	-	-		-		3.129	Jun 2021	-		3.129	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		3.129		-		3.129	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Pilot Training Next Test Activities	TBD	TBD : TBD	-	-		-		0.150		-		0.150	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		0.150		-		0.150	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administrative Support	TBD	Not specified. : TBD	-	-		-		0.450	Jan 2021	-		0.450	Continuing	Continuing	-
Administrative and Advisory Services Support	TBD	Not specified. : TBD	-	-		-		0.650	Mar 2021	-		0.650	Continuing	Continuing	-
Government Travel	Various	Not specified. : TBD	-	-		-		0.100	Jan 2021	-		0.100	Continuing	Continuing	-
<b>Subtotal</b>			-	-		-		1.200		-		1.200	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	-	0.000	4.479	-	4.479	Continuing	Continuing	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0804772F / <i>Training Developments</i>	<b>Project (Number/Name)</b> 652400 / <i>Training Developments</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Pilot Training Next Studies</i></b>	
Pilot Training Next Systems Development	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0804772F / <i>Training Developments</i>	<b>Project (Number/Name)</b> 652400 / <i>Training Developments</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Pilot Training Next Studies</i></b>				
Pilot Training Next Systems Development	2	2021	4	2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0901299F / AF A1 Systems
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	8.467	0.000	8.467	0.000	0.000	0.000	0.000	0.000	8.467
650007: <i>AF A1 Systems</i>	-	0.000	0.000	8.467	0.000	8.467	0.000	0.000	0.000	0.000	0.000	8.467
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
This program, BA 5, PE 0901299F, project 650007, Develop The Inspector Generals Instructional and Informational Readiness System (TIGIIRS), is a new start.

**A. Mission Description and Budget Item Justification**  
Inspector Generals (IG) lack a standardized integrated system for planning, executing, reporting & analyzing Wing Performance and Readiness. This capability gap precludes IG from efficiently accomplishing 10USC8020 responsibility to "report upon the discipline, efficiency and economy of the Air Force" and those responsibilities directed by SecAF & CSAF in Readiness Review Task #26. The legacy capability is built upon a MAJCOM-generated architecture that was transitioned to a program of record in FY10 as an interim gapping solution. Estimated that the legacy system is not sustainable beyond FY 24. This funding provides for the development foundation of the Next Gen System.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	8.467	0.000	8.467
Total Adjustments	0.000	0.000	8.467	0.000	8.467
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	8.467	0.000	8.467

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>
<b>Title:</b> Develop The Inspector Generals Instructional and Informational Readiness System (TIGIIRS)	-	0.000	8.467

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0901299F / AF A1 Systems
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> The RDT&amp;E funds will be used for development efforts against requirements that were finalized through a BCAC (Business Capability Acquisition Cycle) Business Process Mapping and Re-engineering (BPM/BPR). Funds multiple prototypes of the BPM/BPR identified functional capabilities. These prototypes will be provided to AFLCMC/HI by selected contractors through a competitive BCAC selection process. These prototypes will form the foundation of the Next Gen system.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> Identification/Definition of IT Functional Requirements &amp; Information Assets, conduct Market Analysis, prototyping viable IT solution concepts, development of initial Cybersecurity Strategy, evaluation for compliance with Clinger Cohen Act, assessment of technical solution approaches, stakeholder demonstrations &amp; evaluations, and AFLCMC Program Management.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> New start</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	-	0.000	8.467

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
All funding will be provided to AFLCMC/HIQD for execution with a planned strategy of incremental delivery with management by AFLCMC as integrator.



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0901299F / AF A1 Systems	<b>Project (Number/Name)</b> 650007 / AF A1 Systems
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Identification/Definition of IT Functional Requirements & Information Assets	Various	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.000		1.620	Feb 2021	-		1.620	Continuing	Continuing	-
Development of initial Cybersecurity Strategy	Reqn	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.000		0.750	Mar 2021	-		0.750	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		0.000		2.370		-		2.370	Continuing	Continuing	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AFLCMC Program Management	Various	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.000		0.877	Nov 2020	-		0.877	Continuing	Continuing	-
Travel	Various	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.000		0.210	Oct 2020	-		0.210	Continuing	Continuing	-
Not specified.	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.000		0.000		1.087		-		1.087	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Market Analysis	C/CPAF	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.000		0.540	Dec 2020	-		0.540	Continuing	Continuing	-
Prototyping of viable IT solution concepts	C/CPAF	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.000		1.220	Jan 2021	-		1.220	Continuing	Continuing	-
Clinger Cohen Act compliance evaluation	C/CPAF	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.000		0.610	Jun 2021	-		0.610	Continuing	Continuing	-
Stakeholder demonstrations & evaluations	C/CPAF	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.000		0.430	Jul 2021	-		0.430	Continuing	Continuing	-



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0901299F / AF A1 Systems	<b>Project (Number/Name)</b> 650007 / AF A1 Systems
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
<b><i>IG Instructional &amp; Informational Readiness System (TIGIIRS- Next Gen)</i></b>																												
AFLCMC Program Management									■	■	■	■																
Identification/Definition of IT Functional Requirements & Information Assets									■																			
Market Analysis									■	■																		
Prototyping of viable IT solution concepts									■																			
Development of initial Cybersecurity Strategy									■	■																		
Clinger Cohen Act compliance evaluation											■	■																
Assessment of technical solution approaches											■	■																
Stakeholder demonstrations & evaluations											■																	
Travel									■	■	■	■																

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0901299F / AF A1 Systems	<b>Project (Number/Name)</b> 650007 / AF A1 Systems
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>IG Instructional &amp; Informational Readiness System (TIGIIRS- Next Gen)</i></b>				
AFLCMC Program Management	1	2021	4	2021
Identification/Definition of IT Functional Requirements & Information Assets	2	2021	2	2021
Market Analysis	1	2021	2	2021
Prototyping of viable IT solution concepts	2	2021	2	2021
Development of initial Cybersecurity Strategy	2	2021	3	2021
Clinger Cohen Act compliance evaluation	3	2021	4	2021
Assessment of technical solution approaches	3	2021	4	2021
Stakeholder demonstrations & evaluations	4	2021	4	2021
Travel	1	2021	4	2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203176F / <i>Combat Survivor Evader Locator</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.913	2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
654522: <i>CSAR EMD</i>	-	0.913	2.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY 2021, funding in PE 1203176F, Combat Survivor Evader Locator is transferred to PE 0305176F, Combat survivor Evader Locator.

The Combat Survivor Evader Locator (CSEL) System provides aircrews with end-to-end global satellite secure emergency communication capability during combat and peace-time flying operations. CSEL provides a hand held radio as part of the mandatory aircrew survival gear. CSEL is a joint program (AF, Army, and Navy) and is the DoD program of record for personnel recovery survival radios. CSEL supports four of five Personnel Mission Phases: Report, Locate, Support, and Recover.

A National Security Agency (NSA) Cryptographic Modernization mandate and the Ultra High Frequency Follow-On satellite constellation are at the end of life and are driving upgrades to base stations. This effort includes development to modernize the system to integrate common waveforms, integrate broadcast reception for non-CSEL devices, provide for cryptographic modernization, leverage software defined capabilities based on the FY16 cryptographic study, and to procure intellectual property. CSEL will leverage software defined capabilities to replace the legacy handheld radio with a new device that supports report, locate, and recovery missions. The new device will leverage technological advancements and efficiencies to develop a more intuitive device that enables secure communication between the joint warfighter and rescue support teams. This funding will also be used to perform various studies and analysis in support of the CSEL Enterprise.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver CSEL capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203176F / <i>Combat Survivor Evader Locator</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.939	2.000	0.974	0.000	0.974
Current President's Budget	0.913	2.000	0.000	0.000	0.000
Total Adjustments	-0.026	0.000	-0.974	0.000	-0.974
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.026	0.000			
• Other Adjustments	0.000	0.000	-0.974	0.000	-0.974

**Change Summary Explanation**

FY 2021: Funding transferred to PE 0305176F.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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<b>Title:</b> CSEL Next Generation Cryptographic Architecture (NGCA)	0.913	1.000	0.000
<b>Description:</b> A NSA cryptographic modernization mandate and the Ultra High Frequency Follow-On satellite constellation at end of life are both driving upgrades to CSEL Base Stations and Interrogation Module.			
<b>FY 2020 Plans:</b> Complete NGCA Test & Evaluation (T&E).			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Title:</b> CSEL Next Generation Survival Communication Device	0.000	1.000	0.000
<b>Description:</b> A NSA cryptographic modernization mandate and the Ultra High Frequency Follow-On satellite constellation at end of life are both driving upgrades to 60,000 handheld CSEL rescue radios.			
<b>FY 2020 Plans:</b>			

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203176F / <i>Combat Survivor Evader Locator</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
Begin development of NGSCD			
<b><i>FY 2021 Plans:</i></b> N/A			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	0.913	2.000	0.000

**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 05 0305176F: <i>Combat Survivor Evader Locator</i>	-	-	0.973	-	0.973	-	-	-	-	0.000	0.973

**Remarks**  
Funding for this effort transfers to PE 0305176F in FY2021.

**E. Acquisition Strategy**  
The CSEL overall strategy is competition focused. The Technical Data Package is being acquired under the NGCA contract to allow future competition of the CSEL Enterprise. CSEL is furthering competition by partnering with Air Force Research Lab (AFRL). AFRL will develop a Next Gen Survival Communication Device to deliver an innovative materiel solution to the Joint Services. A modular solution requires engagement with multiple development partners to insert modern technologies compatible with a modernized CSEL System.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1203176F / <i>Combat Survivor Evader Locator</i>	<b>Project (Number/Name)</b> 654522 / <i>CSAR EMD</i>
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
AIRWorks Next Generation Cryptographic Architecture (NGCA) Support	MIPR	NAVAIR : Saint Inigoes, MD	-	0.539	Jun 2019	1.000	Dec 2019	-		-		-	Continuing	Continuing	-
Other Agency Support	MIPR	Various : TBD	-	0.020	Jul 2019	-		-		-		-	Continuing	Continuing	-
AFRL Device Support	TBD	AFRL : TBD	-	-		1.000	May 2020	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.559		2.000		-		-		-	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Combined Test	MIPR	Electronic Proving Grnds : Fort Huachuca, AZ	-	0.140	Mar 2019	-		-		-		-	Continuing	Continuing	-
JITC Testing	MIPR	JITC : Fort Huachuca, AZ	-	0.214	Aug 2019	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.354		-		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
	<b>Project Cost Totals</b>		-	0.913	2.000	-	-	-	Continuing	Continuing

**Remarks**  
Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1203176F / <i>Combat Survivor Evader Locator</i>	<b>Project (Number/Name)</b> 654522 / <i>CSAR EMD</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>CSEL Next Generation Cryptographic Architecture (NGCA)</b>																												
CSEL NGCA Test & Evaluation (T&E)																												
<b>CSEL Next Generation Survival Communication Device (NGSCD)</b>																												
CSEL NGSCD Development																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1203176F / <i>Combat Survivor Evader Locator</i>	<b>Project (Number/Name)</b> 654522 / <i>CSAR EMD</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>CSEL Next Generation Cryptographic Architecture (NGCA)</b>				
CSEL NGCA Test & Evaluation (T&E)	4	2019	4	2020
<b>CSEL Next Generation Survival Communication Device (NGSCD)</b>				
CSEL NGSCD Development	2	2020	4	2020

**Note**

In FY 2021, funds transfer to PE 0305176F

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203269F / <i>GPS III Follow-On (GPS IIIIF)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	202.760	412.202	447.875	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,062.837
653170: <i>GPS IIIIF</i>	202.760	412.202	447.875	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1,062.837
Quantity of RDT&E Articles	-	2	-	-	-	-	-	-	-	-	-	

**Program MDAP/MAIS Code:** 590

**A. Mission Description and Budget Item Justification**

In FY2021, PE 1203269F, GPS III Follow-On (GPS IIIIF) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1203269SF GPS III Follow-On (GPS IIIIF) from Appropriation 3600, Budget Activity 5 due to the creation of a new Appropriation for Space Force.

The Global Positioning System (GPS) is a space-based navigation system that fills validated Joint Service requirements for worldwide, accurate, common grid three-dimensional positioning/navigation for military aircraft, ships, and ground personnel. The consistent accuracy, unaffected by location or weather and available in real time, significantly improves effectiveness of reconnaissance, weapons delivery, mine countermeasures and rapid deployment for all services. GPS must comply with Title 10 United States Code (USC) Sec. 2281, which requires that the Secretary of Defense ensures the continued sustainment and operation of GPS for military and civilian purposes, and 51 USC Sec. 50112, which requires that GPS complies with certain standards and facilitates international cooperation.

The system is composed of three segments: User Equipment (funded under Program Element (PE) 1203164F), Space (funded under PE 1203265F, 1203165F, and 1203269F), and a Control Network (funded under PE 1206423F and 1203165F). The satellites broadcast high-accuracy data using precisely synchronized signals that are received and processed by user equipment installed in military platforms. The user equipment computes the platform position and velocity and provides steering vectors to target locations or navigation waypoints. The control segment provides daily updates to the navigation messages broadcast from the satellites to maintain system precision in three dimensions to 16 meters (spherical error probable) worldwide. Additionally, GPS supports the United States Nuclear Detonation (NUDET) Detection System (USNDS) mission and provides strategic and tactical support to the following Department of Defense (DoD) missions: Joint Operations by providing capabilities for Positioning, Navigation, and Timing (PNT); Command, Control, Communications, and Intelligence (C3I); Special Operations; Military Operations in Urban Terrain (MOUT); Defense-Wide Mission Support (DWMS); Air Mobility; and Space Launch Orbital Support.

GPS IIIIF delivers GPS III satellites beyond the first ten Space Vehicles (SVs) being delivered by the GPS III program (funded in PE 1203265F GPS III Space Segment). The GPS IIIIF satellites maintain the same capabilities as the GPS III satellites, but also deliver significant enhancements to include: backward compatibility, unified S-Band (USB) interface compliance, integration of hosted payloads including a redesigned USNDS payload, Laser Retro-reflector Arrays (LRAs), Search and Rescue/GPS (SAR/GPS) and Energetic Charged Particles (ECP) sensor, and Regional Military Protection (RMP) capabilities that provide the ability to deliver high-power regional Military Code (M-Code) signals in specific areas of intended effect. Implementation of RMP into the GPS Enterprise requires integration with the ground and user segments, executed by the GPS Next Generation Operational Control System (OCX), along with the Military GPS User Equipment (MGUE) programs, respectively. The SAR/GPS payload provided by Canada fills a validated National Search and Rescue Committee requirement to provide enduring, space-based distress alerting capability to detect, locate, and relay distress alerts to fulfill its responsibilities under international agreements for Search and Rescue. LRA, built by the Naval Research

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203269F / <i>GPS III Follow-On (GPS IIIIF)</i>
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Lab (NRL), is a passive reflector that improves accuracy and provides better ephemeris data. National Geospatial-Intelligence Agency (NGA) funds the integration costs of the LRA.

This PE funds the Research, Development, Test, and Evaluation (RDT&E) of GPS IIIIF SVs 11-12 (to include Non-Recurring Engineering (NRE) support efforts). This program includes risk-reducing simulators and systems engineering associated with delivering the new capabilities required of GPS IIIIF satellites.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This PE may include necessary civilian pay expenses required to manage, execute, and deliver GPS IIIIF Space Segment weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PEs 1206392F and 1206398F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	426.889	462.875	279.423	0.000	279.423
Current President's Budget	412.202	447.875	0.000	0.000	0.000
Total Adjustments	-14.687	-15.000	-279.423	0.000	-279.423
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-15.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-14.687	0.000			
• Other Adjustments	0.000	0.000	-279.423	0.000	-279.423

**Change Summary Explanation**

FY2020: -\$15.000M Re-sorting acquisition accountability. Excess to need.  
 FY2021: -\$263.496M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203269F / <i>GPS III Follow-On (GPS IIIIF)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> GPS III Follow-On (GPS IIIIF) Development</p> <p><b>Description:</b> The program utilizes RDT&amp;E funds to develop and deliver SVs 11-12, conduct the NRE of develop risk-reducing simulators, developing support test equipment, and conducting the systems engineering associated with delivering the new capabilities required of GPS IIIIF including backward compatibility, dual band Telemetry, Tracking, and Control (TT&amp;C), integration of Government Furnished Equipment (GFE) hosted payloads, and RMP, which delivers high power regional M-Code signals in specific areas of intended effect.</p> <p><b>FY 2020 Plans:</b> Complete Critical Design Review (CDR) and continue NRE efforts and hardware purchases to support SVs 11-12 development, GPS IIIIF Production Non-flight Satellite Testbed (GNST+), and software simulators. Conduct Milestone C in Q3FY20 in preparation to exercise production satellite buys. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to, continued program office support, studies, technical analysis, experimentation, prototyping, etc. Continue program office support and other related support activities that may include, but are not limited to, studies, technical analysis, experimentation, prototyping, etc.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	412.202	447.875	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	412.202	447.875	0.000

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2021</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
			<b>Base</b>	<b>OCO</b>	<b>Total</b>						
• SPAF 01 GPS03C: <i>GPSIII Follow On</i>	-	414.625	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	414.625
• RDTE 07 1203265F: <i>GPS III Space Segment</i>	72.096	42.440	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	114.536
• SPAF 01 GPSIII: <i>GPS III Space Segment</i>	69.386	31.466	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	100.852

**Remarks**

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203269F / <i>GPS III Follow-On (GPS IIIIF)</i>
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**E. Acquisition Strategy**

In December 2017, Principal Deputy Office of the Assistant Secretary of the Air Force (Acquisition & Logistics) declared the GPS IIIIF program a new start beginning in FY 2019 and, consistent with the Fiscal Year 2016 National Defense Authorization Act (NDAA), the program was categorized as an Acquisition Category (ACAT) (1B) Major Defense Acquisition Program (MDAP) with the Service Acquisition Executive (SAE) serving as the Milestone Decision Authority (MDA). During this time, the MDA approved the second phase of the two-phased GPS III Follow-On acquisition strategy. Executed using funds in PE 1203265F, GPS III Space Segment, the Phase 1 Production Readiness Feasibility Assessments conducted during FY 2016-2017 provided data and insight into contractors' GPS satellite production designs with emphasis on a mature navigation payload and production-ready designs. Phase 1 results affirmed the viability of a competitive approach for Phase 2. The Phase 2 strategy directed the Air Force to conduct a full-and-open competition for GPS IIIIF space vehicles and specified the use of RDT&E funds to deliver SVs 11-12 and conduct associated NRE. In addition to SVs 11-12, the RDT&E effort will be comprised of developing risk-reducing simulators, support test equipment, and conducting the systems engineering associated with delivering the new capabilities required of GPS IIIIF. The Air Force awarded the contract to Lockheed Martin in September 2018 and began the 1-year CDR campaign in March 2019. Completion of CDR is scheduled for March 2020 followed by Milestone C in Q3FY20. Upon Milestone C approval, the Air Force will procure SV 13+ via annual contract options exercised using Space Procurement, Air Force (SPAF) funds consistent with full-funding policy under an annual buy approach.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1203269F / GPS III Follow-On (GPS IIIIF)	<b>Project (Number/Name)</b> 653170 / GPS IIIIF
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GPS IIIIF Development	C/FPIF	Lockheed Martin : Littleton, CO	189.393	349.026	Nov 2018	403.438	Dec 2019	-		-		-	0.000	941.857	-
GPS IIIIF Technical Mission Analysis	MIPR	Various : Various	0.750	8.384	Dec 2018	6.701	Dec 2019	-		-		-	0.000	15.835	-
GPS IIIIF Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	6.026	13.414	Dec 2018	12.107	Dec 2019	-		-		-	0.000	31.547	-
<b>Subtotal</b>			196.169	370.824		422.246		-		-		-	0.000	989.239	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GPS IIIIF Test and Evaluation	Various	Various : Various	0.000	1.140	Mar 2019	2.053	Mar 2020	-		-		-	0.000	3.193	-
<b>Subtotal</b>			0.000	1.140		2.053		-		-		-	0.000	3.193	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GPS IIIIF FFRDC	MIPR	Aerospace Corp : El Segundo, CA	1.100	5.736	Dec 2018	4.478	Dec 2019	-		-		-	0.000	11.314	-
GPS IIIIF A&AS	Various	Various : El Segundo, CA	5.230	34.102	Jan 2019	18.448	Dec 2019	-		-		-	0.000	57.780	-
GPS IIIIF Other Support	Various	Various : El Segundo, CA	0.261	0.400	Oct 2018	0.650	Oct 2019	-		-		-	0.000	1.311	-
<b>Subtotal</b>			6.591	40.238		23.576		-		-		-	0.000	70.405	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	202.760	412.202	447.875	-	-	-	0.000	1,062.837	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1203269F / GPS III Follow-On (GPS IIIIF)	<b>Project (Number/Name)</b> 653170 / GPS IIIIF
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	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
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**Remarks**  
 FINANCIAL PERFORMANCE: GPS IIIIF is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. However, unlike many traditional R&D programs, the GPS IIIIF R&D and Production phases fall under a Fixed Price Incentive Firm Target (FPIF) contract type with progress payments. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1203269F / GPS III Follow-On (GPS III F)	<b>Project (Number/Name)</b> 653170 / GPS III F

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
<b>GPS III F</b>																												
GPS III F CDR																												
GPS III F Milestone C																												
GSS 1 & 2 Subsystem Procurement & Build																												
GNST+ Subsystem Procurement & Build																												
SV11 Subsystem Procurement & Build																												
SV12 Subsystem Procurement & Build																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1203269F / <i>GPS III Follow-On (GPS IIIIF)</i>	<b>Project (Number/Name)</b> 653170 / <i>GPS IIIIF</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>GPS IIIIF</b>				
GPS IIIIF CDR	2	2019	2	2020
GPS IIIIF Milestone C	3	2020	3	2020
GSS 1 & 2 Subsystem Procurement & Build	1	2019	4	2020
GNST+ Subsystem Procurement & Build	1	2019	4	2020
SV11 Subsystem Procurement & Build	1	2019	4	2020
SV12 Subsystem Procurement & Build	1	2019	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203940F / <i>Space Situation Awareness Operations</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	35.569	56.829	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
65A037: <i>Ground Based Optical Sensor System (GBOSS)</i>	-	35.569	56.829	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY2021, PE 1203940F, Space Situational Awareness Operations efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1203940SF Space Situation Awareness Operations from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

Space Situational Awareness (SSA) is knowledge of all aspects of space related to operations. As the foundation for space control, SSA encompasses surveillance of all space objects and activities; detailed surveillance of specific space assets; monitoring space environmental conditions; monitoring cooperative space assets; gathering indications and warning on adversary space operations; and conducting integrated command, control, communications, processing, analysis, dissemination, and archiving activities. This program element fields, upgrades, operationalizes, operates and maintains Air Force sensors and information integration capabilities within the SSA network while companion program element 1206425F, Space Situational Awareness Systems, develops new network sensors and improved information integration capabilities across the network. Funds also support efforts such as engineering studies and analyses, architectural engineering studies, trade studies, technology needs forecasting, modernization initiatives, systems engineering, system development, and test & evaluation, and may include prototyping and technology demonstration. Activities funded in this program element (1203940F) focus on surveillance of objects in earth orbit to aid tasks including satellite tracking; space object identification; tracking and cataloging; satellite attack warning; notification of satellite flyovers to U.S. forces; space treaty monitoring; and technical intelligence gathering.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Ground Based Optical Sensor System (GBOSS) capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203940F / <i>Space Situation Awareness Operations</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	46.015	76.829	70.704	0.000	70.704
Current President's Budget	35.569	56.829	0.000	0.000	0.000
Total Adjustments	-10.446	-20.000	-70.704	0.000	-70.704
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-20.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-8.892	0.000			
• SBIR/STTR Transfer	-1.554	0.000			
• Other Adjustments	0.000	0.000	-70.704	0.000	-70.704

**Change Summary Explanation**

FY 2019: \$8.892M reprogramming for higher Air Force priorities.

FY 2020: \$20.000M reduction to account for the availability of prior year execution balances.

FY 2021: -\$41.897M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.(\$70.704M reduced by \$28.807M for prior year carry over)

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Ground Based Optical Sensor System (GBOSS)	35.569	56.829	0.000
<b>Description:</b> GBOSS provides global ground based optical sensor capability for Space Situational Awareness (SSA). GBOSS improves sensitivity, search rate, tracking of non-cooperative launches, precise tagging of clustered objects, and detection of closely spaced dim objects. This effort includes fielding GBOSS capabilities in optimal global locations, upgrading existing Ground-based Electro-Optical Deep Space Surveillance (GEODSS) sensors to improve sensitivity and search rates, and may acquire new advanced technology sensor(s) to improve global electro-optical sensor resilience and persistence. The effort will coordinate with Combined Space Operations Center (CSpOC), National Space Defense Center (NSDC), and National Air and Space Intelligence Center (NASIC) efforts to ensure enterprise data fusion and dissemination supporting Enterprise Space Battle Management Command, and Control (ESBMC2).			
<b>FY 2020 Plans:</b> Complete final GBOSS Technology Maturation and Risk Reduction activities and initiate Engineering Manufacturing Development. Rapidly respond to and implement system resiliency and situational awareness necessary to operate in the contested space			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203940F / <i>Space Situation Awareness Operations</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
domain. Activities may include, but are not limited to, program office support, studies, technical analysis, experimentation, prototyping, etc.  <b>FY 2021 Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	35.569	56.829	0.000

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
Program established as an FY 2018 new start to address ground-based optical SSA gaps and shortfalls in supporting the Space Warfighting Construct (SWC). The acquisition strategy approved by AFPEO/SP in March 2018 accelerates the development and fielding of the solution, minimizing the time to address the requirements in light of current and emerging threats. Initial technology maturation and risk reduction will be executed using existing DoD, IC, and lab contracts. TMRR and EMD effort will be executed on a new contract awarded through full and open competition. The approved acquisition strategy supports fielding Initial Operational Capability (IOC) in the European theater in 2023 and Final Operational Capability (FOC) of the global capability in 2024.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1203940F / <i>Space Situation Awareness Operations</i>	<b>Project (Number/Name)</b> 65A037 / <i>Ground Based Optical Sensor System (GBOSS)</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GBOSS design, development and life extension	Various	Multiple : Colorado Springs, CO	-	30.197	Nov 2018	49.800	Mar 2020	0.000		-		0.000	Continuing	Continuing	-
GBOSS Technical Mission Analysis	C/CPIF	NASA/JPL : Pasadena, CA	-	2.000	Dec 2018	-		0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	32.197		49.800		0.000		-		0.000	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS	Various	Multiple: Various : Various	-	1.570	May 2019	2.000	Apr 2020	0.000		-		0.000	Continuing	Continuing	-
FFRDC	Various	Multiple: Various : Various	-	1.752	May 2019	4.929	Apr 2020	0.000		-		0.000	Continuing	Continuing	-
Other Support	C/CPAF	Various: Various : Various	-	0.050	Oct 2018	0.100	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	3.372		7.029		0.000		-		0.000	Continuing	Continuing	N/A

			Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>			-	35.569	56.829	0.000	-	0.000	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force			<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 3600 / 5		<b>R-1 Program Element (Number/Name)</b> PE 1203940F / <i>Space Situation Awareness Operations</i>			<b>Project (Number/Name)</b> 65A037 / <i>Ground Based Optical Sensor System (GBOSS)</i>		

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>GBOSS Phase I Development</b>	
GBOSS TMRR	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1203940F / <i>Space Situation Awareness Operations</i>	<b>Project (Number/Name)</b> 65A037 / <i>Ground Based Optical Sensor System (GBOSS)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>GBOSS Phase I Development</i></b>				
GBOSS TMRR	1	2019	4	2020



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206421F / <i>Counterspace Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	19.637	27.037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
65A001: <i>Counter Satellite Communications System</i>	-	13.962	19.808	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
65A005: <i>Offensive Counterspace (OCS) C2</i>	-	3.824	5.282	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
65A013: <i>BOUNTY HUNTER</i>	-	1.851	1.947	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206421F, Counterspace Systems efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206421SF Counterspace Systems from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

Acquisition Decision Memorandum (ADM) April 24th 2009, directed all capabilities identified in the October 4th 2006, Counter Communications System (CCS) Block 20, Joint Requirements Oversight Council (JROC) approved Capability Development Document (CDD) shall be accomplished as Pre-planned Product Improvement Program (P3I) upgrades to the CCS Block 10. On April 11th 2016, Air Force Space Command (AFSPC) updated ADM adding additional responsibility for CCS Block 10.3 Meadowlands.

CCS provides expeditionary, deployable, reversible offensive space control (OCS) effects applicable across the full spectrum of conflict. It prevents adversary Satellite Communications (SATCOM) in Area of Responsibility (AOR) including Command & Control (C2), Early Warning and Propaganda, and hosts Rapid Reaction Capabilities in response to Urgent Needs. This program effort includes architecture engineering and studies, system hardware design and development, software design and integration, and testing and demonstration of capabilities to provide disruption of satellite communications signals.

Space Acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Counterspace weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206421F / <i>Counterspace Systems</i>
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Bounty Hunter (BH) supports the Defensive Space Control of US systems in a specific AOR and provides the capacity to prevent effective adversary use of Command, Control, Communications, Computers, and Intelligence (C4I). Continuing annual agile development is needed to meet new user needs in an ever changing threat environment.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Bounty Hunter weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	20.242	29.037	27.588	0.000	27.588
Current President's Budget	19.637	27.037	0.000	0.000	0.000
Total Adjustments	-0.605	-2.000	-27.588	0.000	-27.588
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-2.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.605	0.000			
• Other Adjustments	0.000	0.000	-27.588	0.000	-27.588

**Change Summary Explanation**

FY 2020: \$2.000M reduction to account for the availability of prior year execution balances.

FY 2021: -\$54.689M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force (\$27.037M increase for CCS).

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 1206421F / <i>Counterspace Systems</i>				<b>Project (Number/Name)</b> 65A001 / <i>Counter Satellite Communications System</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
65A001: <i>Counter Satellite Communications System</i>	-	13.962	19.808	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206421F, Counter Satellite Communications System efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206421SF Counter Satellite Communications System from Appropriation 3600, Budget Activity [05] due to the creation of a new Appropriation for Space Force.

Acquisition Decision Memorandum (ADM) April 24th 2009, directed all capabilities identified in the Oct 4th 2006 CCS Block 20, Joint Requirements Oversight Council (JROC) approved Capability Development Document (CDD) shall be accomplished as Pre-planned Product Improvement Program (P3I) upgrades to the Counter Communications System (CCS) Block 10. On April 11th 2016, Air Force Space Command (AFSPC) A5/A8/A9 signed and updated ADM adding additional responsibility for CCS Block 10.3 Meadowlands.

CCS provides expeditionary, deployable, reversible offensive space control (OCS) effects applicable across the full spectrum of conflict. It prevents adversary Satellite Communications (SATCOM) in Area of Responsibility (AOR) including Command & Control (C2), Early Warning and Propaganda, and hosts Rapid Reaction Capabilities in response to Urgent Needs. This program effort includes architecture engineering and studies, system hardware design and development, software design and integration, and testing and demonstration of capabilities to provide disruption of satellite communications signals.

JETSS is the Counterspace Command and Control (C2) system for mission planning and execution monitoring currently in use at the Combined Space operations Center (CSpOC) Special Technical Operations (STO) Cell.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Counter Communications System (CCS) Pre-planned Product Improvement (P3I) Program	13.962	19.808	0.000
<b>Description:</b> Develop, integrate, test and field the CCS P3I program. This is an incremental approach to deliver Block 20 CCS capabilities.			
<b>FY 2020 Plans:</b> Continue P3I development, integration and testing of CCS Block 10.3 Meadowlands. Include additional CCS Block 20 CDD capabilities in CCS Block 10.3 Meadowlands, design forward garrison systems, mission techniques, mission specific emulators, and multi-range integration. Rapidly respond and implement system resiliency and situational awareness necessary to operate in the contested space domain. RDT&E funding is required to support this transformation and enable Space Superiority end-to-end			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206421F / <i>Counterspace Systems</i>	<b>Project (Number/Name)</b> 65A001 / <i>Counter Satellite Communications System</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
integration activities such as, but not limited to, program office support, studies, technical analysis, experimentation, prototyping, architectural development, systems engineering, demonstrations, testing, command and control integration, mission partner integration, and space test/combat range events.			
<b><i>FY 2021 Plans:</i></b> N/A			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	13.962	19.808	0.000

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• SPAF 01 1206421F: <i>Counterspace Systems</i>	1.121	5.700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.821

**Remarks**

**D. Acquisition Strategy**  
All contracts in this program element will be awarded using competitive procedures to the maximum extent possible, to upgrade existing capabilities as well as to acquire next generation capabilities through incremental acquisitions.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 5				PE 1206421F / Counterspace Systems				65A001 / Counter Satellite Communications System							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Block 10 P3I Development	Various	Various : El Segundo, CA	-	6.892	Feb 2019	12.632	Feb 2020	-		-		-	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	-	1.095	Oct 2018	0.724	Oct 2019	-		-		-	Continuing	Continuing	11.144
Enterprise Systems Engineering and Integration	C/FFP	AT&T : El Segundo, CA	-	0.368	May 2019	0.199	May 2020	-		-		-	Continuing	Continuing	-
Counterspace Architecture Development	C/CPFF	NGMS : Redondo Beach, CA	-	-		-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	8.355		13.555		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Security	C/CPAF	Mantech : El Segundo, CA	-	2.177	Nov 2018	2.215	Nov 2019	-		-		-	Continuing	Continuing	-
Miscellaneous Support Services	Various	Various : TBD	-	0.007	Nov 2018	0.008	Nov 2019	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	2.184		2.223		-		-		-	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Testing Support	MIPR	25 Space Range Squadron : Peterson AFB, CO	-	0.116	Oct 2018	-		-		-		-	0.000	0.116	-
<b>Subtotal</b>			-	0.116		-		-		-		-	0.000	0.116	N/A





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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206421F / <i>Counterspace Systems</i>	<b>Project (Number/Name)</b> 65A001 / <i>Counter Satellite Communications System</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>CCS B10.3</b>				
10.2 System Deliveries : #3-16	1	2019	4	2020
10.3 Authority To Proceed (ATP)	2	2019	2	2019
10.3. Development	2	2019	4	2020

**Note**

For CCS B10.2, 14 systems delivered plus 2 trainers.



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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206421F / <i>Counterspace Systems</i>	<b>Project (Number/Name)</b> 65A005 / <i>Offensive Counterspace (OCS) C2</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
65A005: <i>Offensive Counterspace (OCS) C2</i>	-	3.824	5.282	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This effort supports the evolution of command and control (C2) and mission planning capabilities in support of the fielding and employment of Counterspace Systems. It provides for the integration and upgrade of collaborative tools to link deployable counterspace systems with Joint Warfighting C2 systems and to enable integrated planning and execution of the counterspace mission. Upgraded capabilities will be integrated into current and future command and control systems. This program will leverage the Joint Execution and Tasking System for Space (JETSS) effort in C2 for future space control and counterspace mission capabilities. Requirements for this program are derived from AFSPC prioritized requirements, in accordance with AFSPC 63-104.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> Joint Execution and Tasking System for Space (JETSS)	3.824	5.282	-
<b>Description:</b> Evolve with upgrades the counterspace mission planning and C2 capability to support counterspace systems space control warfighter activities.			
<b>FY 2020 Plans:</b> Continue Spiral 6 development of higher protection level to support multiple classification levels and risk reduction efforts to support C2 initiatives for various programs.			
Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. activities may include, but are not limited to, program office support, studies, technical analysis, prototyping, etc.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	3.824	5.282	-

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

-

**D. Acquisition Strategy**

All contracts will be awarded using competitive procedures to the maximum extent possible to acquire next generation capabilities through incremental acquisitions.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force			<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 3600 / 5		<b>R-1 Program Element (Number/Name)</b> PE 1206421F / <i>Counterspace Systems</i>			<b>Project (Number/Name)</b> 65A005 / <i>Offensive Counterspace (OCS) C2</i>		

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>JETSS</b>	
C2 Spiral #6 Development	
C2 Spiral #6 Test	
C2 Spiral #6 Delivery	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206421F / <i>Counterspace Systems</i>	<b>Project (Number/Name)</b> 65A005 / <i>Offensive Counterspace (OCS) C2</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>JETSS</b>				
C2 Spiral #6 Development	1	2019	1	2020
C2 Spiral #6 Test	4	2019	4	2019
C2 Spiral #6 Delivery	1	2020	1	2020

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 1206421F / <i>Counterspace Systems</i>				<b>Project (Number/Name)</b> 65A013 / <i>BOUNTY HUNTER</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
65A013: <i>BOUNTY HUNTER</i>	-	1.851	1.947	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Bounty Hunter (BH) supports the Defensive Space Control of US systems in a specific AOR and provides the capacity to prevent effective adversary use of Command, Control, Communications, Computers, and Intelligence (C4I). Continuing annual agile development is needed to meet new user needs in an ever changing threat environment.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Bounty Hunter weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Bounty Hunter	1.851	1.947	0.000
<b>Description:</b> Develop new capabilities for the Bounty Hunter program to maintain operational capability. Specific accomplishments are classified.			
<b>FY 2020 Plans:</b> Complete development and integration of UHF capability. Resolve any new tech obsolescence HW and SW challenges with new system component purchases for additional new system delivery to a new AOR. Prepare R&D plan for new total system upgrade to BH 3.0 to allow for system component consolidation and consideration for remote operation. Rapidly respond to reach and maintain pace with the threat environment and implement system resiliency and situational awareness necessary to operate in the contested space domain. Begin transition of some R&D activities from MITRE to a commercial vendor. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	1.851	1.947	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206421F / <i>Counterspace Systems</i>	<b>Project (Number/Name)</b> 65A013 / <i>BOUNTY HUNTER</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF 01 CTRSPC: <i>Counterspace Systems</i>	1.121	-	-	-	-	-	-	-	-	0.000	1.121

**Remarks**  
BH was established as a new start in FY16 as a JCTD project in response to a JUON in 2010. BH was established as a Program of Record (PoR) in March 2019.

**D. Acquisition Strategy**  
Contracts funded for this program shall be awarded to MITRE, a Federally Funded Research and Development Center (FFRDC). The establishment of a commercial vendor has yet to be determined.



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206421F / <i>Counterspace Systems</i>	<b>Project (Number/Name)</b> 65A013 / <i>BOUNTY HUNTER</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>BOUNTY HUNTER</i></b>	
Bounty Hunter Agile Development 2019	
2019 Continuous Delivery	
Bounty Hunter Agile Development 2020	
2020 Continuous Delivery	



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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206421F / <i>Counterspace Systems</i>	<b>Project (Number/Name)</b> 65A013 / <i>BOUNTY HUNTER</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>BOUNTY HUNTER</i></b>				
Bounty Hunter Agile Development 2019	1	2019	4	2019
2019 Continuous Delivery	2	2019	1	2020
Bounty Hunter Agile Development 2020	1	2020	4	2020
2020 Continuous Delivery	2	2020	1	2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206422F / <i>Weather System Follow-on</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	2.237	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.237
65A038: <i>SSA Environmental Monitoring</i>	-	0.000	2.237	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.237
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206422F, Weather System Follow-on, Project 65A038, SSA Environmental Monitoring efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206422SF, Weather System Follow-on, Project 65A038, SSA Environmental Monitoring from Appropriation Budget Activity 05 due to the creation of a new Appropriation for Space Force.

The Space Situational Awareness Environmental Monitoring (SSAEM) program is a non-ACAT, Class D technology demonstration project to support the international Constellation Observing System for Meteorology, Ionosphere and Climate 2 (COSMIC-2) mission. The SSAEM program provides the acquisition, development and launch/on-orbit support of 18 space/terrestrial weather sensors to COSMIC-2 partnership in coordination with National Oceanic and Atmospheric Administration (NOAA) and Taiwan's National Space Organization (NSPO). COSMIC-2 is launching six satellites in an equatorial, Low Earth Orbit (LEO) with 3 SSAEM sensors in each spacecraft by FY 2019. The sensor types are Tri-Global Navigation Satellite System (Tri-GNSS) Radio occultation System (TGRS), Ion Velocity Meter (IVM) and Radio Frequency Beacon (RFB). The SSAEM sensors will address three distinct Joint Requirement Oversight Committee (JROC)-approved Category A weather gaps, specifically Gap #4 (Ionospheric Density), Gap #7 (Equatorial Ionospheric Scintillation) and Gap #12 (Electric Field), to provide additional space meteorological data to improve forecast capabilities and improve warfighter navigation/communication capabilities.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver WSF weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)	<b>R-1 Program Element (Number/Name)</b> PE 1206422F I Weather System Follow-on
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	2.237	2.527	0.000	2.527
Current President's Budget	0.000	2.237	0.000	0.000	0.000
Total Adjustments	0.000	0.000	-2.527	0.000	-2.527
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-2.527	0.000	-2.527

**Change Summary Explanation**

FY 2021: -\$2.527M: funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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<b>Title:</b> Space Situational Awareness Environmental Monitoring (SSAEM)	0.000	2.237	0.000
<b>Description:</b> The SSAEM program is a non-ACAT, Class D technology demonstration project to support international Constellation Observing System for Meteorology, Ionosphere and Climate 2 (COSMIC-2) mission. The SSAEM program provides the acquisition, development and launch/on-orbit support of 18 space/terrestrial weather sensors to COSMIC-2 partnership in coordination with National Oceanic and Atmospheric Administration (NOAA) and Taiwan's National Space Organization (NSPO). On June 25th, 2019 COSMIC-2 successfully launched six satellites in an equatorial, Low Earth Orbit (LEO) with 3 SSAEM sensors in each spacecraft. The sensor types are; Tri-GNSS Radio occultation System (TGRS), Ion Velocity Meter (IVM) and Radio Frequency Beacon (RFB). The SSAEM sensors will address three distinct Joint Requirement Oversight Committee (JROC)-approved Category A weather gaps, specifically Gap 4 (Ionospheric Density), 7 (Equatorial Ionospheric Scintillation) and 12 (Electric Field), to provide additional space meteorological data to improve forecast capabilities and improve warfighter navigation/communication capabilities.			
<b>FY 2020 Plans:</b> Continue on-orbit support of SSAEM sensors onboard COSMIC-2 once it reaches proper orbit, and initiates on-orbit checkout, as well as sensor calibration/validation (cal/val). Once the sensors complete on-orbit checkout, and successful cal/val, the program will provide continued remote sensing of space weather coverage until the satellites reach their designed mission End of Life			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206422F / <i>Weather System Follow-on</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
(EoL). Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.  <b>FY 2021 Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	2.237	0.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

SSAEM post-launch and cal/val support contract is the sole-source contract to University Corporation Atmospheric Research due to their expertise in radio occultation and space weather monitoring for SSAEM sensors. The Justification & Approval (J&A) was approved in June 2018 and the Request for Proposal was released on August 1st, 2018. The contract was awarded in July 2019 for 5-years of post-launch cal/val and on-orbit support.

**F. Performance Metrics**

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.





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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206422F / <i>Weather System Follow-on</i>	<b>Project (Number/Name)</b> 65A038 / <i>SSA Environmental Monitoring</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Space Situational Awareness Environmental Monitoring</i></b>				
SSAEM Sensors Cal/Val	3	2019	4	2020



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206425F / <i>Space Situation Awareness Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	139.172	362.894	0.000	0.000	0.000	0.000	0.000	0.000	0.000	244.006	746.072
65A006: <i>Space Based Space Surveillance</i>	0.000	139.172	362.894	0.000	0.000	0.000	0.000	0.000	0.000	0.000	244.006	746.072
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 328

**A. Mission Description and Budget Item Justification**

In FY2021, PE 1206425F, Space Situation Awareness Systems efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206425SF Space Situation Awareness Systems from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

The Space-Based Space Surveillance (SBSS) Block 10 satellite was launched September 2010 with a design life through 2018 and an extended operational capability through 2020. The SBSS Follow-On (SBSS FO) program will develop and deliver a system to continue providing space object surveillance from space post SBSS Block 10 End-of-Life. AFSPC and NRO have signed a Memorandum of Agreement partnering SBSS FO with an NRO program based on overlapping requirements. The new partner program is called SILENTBARKER. SILENTBARKER requirements are based on a Statement of Capabilities and upon the current Space Situational Awareness (SSA) Initial Capabilities Document architectural requirements focused on protecting High Value Assets. SILENTBARKER will provide the capability to search, detect, and track objects from a space-based sensor for timely custody and event detection. Surveillance from space augments and overcomes existing ground sensor limitations with timely 24-hour above-the-weather collection of satellite metric data only possible with a space-based sensor and then communicates its findings to the Combined Space Operations Center (CSpOC), National Space Defense Center (NSDC), and other classified users. This program element includes efforts related to SILENTBARKER, its integration into the broader space superiority architecture, and analysis and experimentation to ensure space-based space surveillance capabilities against the evolving threat.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206425F / <i>Space Situation Awareness Systems</i>
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This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	134.464	412.894	173.131	0.000	173.131
Current President's Budget	139.172	362.894	0.000	0.000	0.000
Total Adjustments	4.708	-50.000	-173.131	0.000	-173.131
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-50.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	8.892	0.000			
• SBIR/STTR Transfer	-4.184	0.000			
• Other Adjustments	0.000	0.000	-173.131	0.000	-173.131

**Change Summary Explanation**

FY 2019: funding request increased by \$8.892M reprogramming to meet contractor's higher than expected burn rate.  
 FY 2020: funding request was reduced by \$50.000M to account for the availability of prior year execution balances.  
 FY 2021: -\$173.074M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> SBSS Follow-On (SBSS FO) Design & Development	139.172	362.894	0.000
<b>Description:</b> Performs space based SSA analysis, research, and development for the SILENTBARKER system in partnership with SILENTBARKER.			
<b>FY 2020 Plans:</b> Complete SILENTBARKER partner development in Engineering and Manufacturing Development (EMD) phase and transition to production phase. Prepare for and conduct Critical Design Review (CDR). Initiate acquisition of capabilities to expand SILENTBARKER coverage in deep space belt. Implement ground mission data processing and scheduling acquisition approach. Identify requirements and technology enhancements to ensure space-based space surveillance capabilities against the evolving threat for future upgrades, extensions, and augmentations through analysis, prototyping, and experimentation. Rapidly respond to and implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206425F / <i>Space Situation Awareness Systems</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
may include, but are not limited to, program office support, studies, integration, technical analysis, experimentation, prototyping, demonstrations, etc. and leverages opportunities for commercial and international partnerships.			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	139.172	362.894	0.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

The Acquisition Strategy was approved to minimize the space-based SSA gap post-SBSS Block 10. SILENTBARKER anticipates Initial Launch Capability in FY 2022. The SBSS FO Materiel Development Decision was approved by the Milestone Decision Authority (MDA) on April 5, 2016. The Acquisition Strategy Panel was completed with the MDA on August 29, 2016. To satisfy the SSA architecture needs, the SBSS FO program requirements combined with an NRO program and were updated in the December 2017 SILENTBARKER Statement of Capabilities. The SBSS FO program remains an Air Force program, but will leverage NRO processes to fulfill SBSS FO space segment and telemetry, tracking, and commanding (TT&C) program segments in order to further National Security Space objectives. Mutual investment for the non-recurring engineering (NRE) cost enables the potential for a larger initial constellation buy and lower unit costs. The Air Force and NRO are implementing the approach to meet mission processing requirements, develop the ground architecture, and extend capabilities in 2020 and beyond.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206425F / <i>Space Situation Awareness Systems</i>	<b>Project (Number/Name)</b> 65A006 / <i>Space Based Space Surveillance</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>SBSS Follow On</b>	
Technology Development, Engineering and Manufacturing Development, Production	
Preliminary Design Review (PDR)	
<b>SBSS Follow On Expanded Coverage</b>	
Acquisition Strategy, RFP Development, Technology Evaluation	
Contract Award	
Technology Development, Engineering and Manufacturing Development, Production	

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206425F / <i>Space Situation Awareness Systems</i>	<b>Project (Number/Name)</b> 65A006 / <i>Space Based Space Surveillance</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>SBSS Follow On</i></b>				
Technology Development, Engineering and Manufacturing Development, Production	1	2019	4	2020
Preliminary Design Review (PDR)	4	2019	4	2019
<b><i>SBSS Follow On Expanded Coverage</i></b>				
Acquisition Strategy, RFP Development, Technology Evaluation	4	2019	2	2020
Contract Award	2	2020	2	2020
Technology Development, Engineering and Manufacturing Development, Production	3	2020	4	2020

**Note**

Event dates are aligned with SILENTBARKER program threshold schedule.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206426F / <i>Space Fence</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	618.100	18.841	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	636.941
65A009: <i>Space Fence</i>	618.100	18.841	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	636.941
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 438

**Note**

In FY2020, Project 65A009, Space Fence, was completed.

**A. Mission Description and Budget Item Justification**

The Space Fence effort develops a system of ground-based sensors to improve upon the former Air Force Space Surveillance System (AFSSS), a Very High Frequency radar operational from 1961 to 2013. The Space Fence provides a more accurate and timely detection capability of smaller orbiting objects, primarily in low-earth orbit (LEO). The system uses higher frequency S-band radars at globally dispersed sites. As a result, it greatly expands the uncued detection and tracking capacity of the Space Surveillance Network, from around 20,000 to 100,000+ objects, while working in concert with other network sensors. Space Fence Radar Site-1 satisfies Initial Operational Capability (IOC) requirement and Radar Site-2 will satisfy Full Operational Capability (FOC) requirements and close the Space Domain Awareness (SDA) LEO gap for discovery and custody/tracking, and synchronize the Site-2 array size to match Site-1 to satisfy resiliency and SDA Geosynchronous Earth Orbit (GEO) sensitivity requirements. Requirements are identified in the June 2012 approved Space Fence Capabilities Development Document (CDD).

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the Space Fence weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206426F / <i>Space Fence</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	19.425	0.000	0.000	0.000	0.000
Current President's Budget	18.841	0.000	0.000	0.000	0.000
Total Adjustments	-0.584	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.584	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Space Fence	18.841	0.000	0.000
<b>Description:</b> Develops S-band SSA radar system to provide detection and tracking capability of objects in Low Earth Orbit.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	18.841	0.000	0.000

<b>D. Other Program Funding Summary (\$ in Millions)</b>											<b>Cost To</b>	
<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Complete</b>	<b>Total Cost</b>	
• SPAF 01 SPCFNC: <i>space fence</i>	46.361	57.784	0.000	-	0.000	-	-	-	-	0.000	104.145	

**Remarks**

**E. Acquisition Strategy**  
A single Engineering Manufacturing and Development (EMD) Production and Deployment contract was awarded on 2 June 2014 to Lockheed Martin Mission Systems and Training. The contract will take the contractor through Critical Design Review (CDR), fabrication, integration, test, production and deployment, with up to two years of



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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	PE 1206426F / <i>Space Fence</i>

Interim Contractor Support (ICS). The program will utilize a two increment approach. Increment 1/Initial Operational Capability (IOC) will consist of successful operations at the first radar site located on the Kwajalein Atoll and the Space Fence Operations Center (SOC) at Reagan Operations Center-Huntsville, AL (ROC-H). Increment 2 (contract option)/FOC will include completion of the second radar at a location to be determined pending a separate Memorandum of Agreement (MOA) decision approval and negotiations with the proposed host nation.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206426F / <i>Space Fence</i>	<b>Project (Number/Name)</b> 65A009 / <i>Space Fence</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Space Fence Development	C/FPIF	Lockheed Martin : Moorestown, NJ	546.966	14.679	Oct 2019	-		-		-		-	0.000	561.645	911.115
Various (Independent Program Assessment, site survey, software, Site Activation Task Force (SATAF), Space Fence Operations Center (SOC))	Various	Various : Various	18.924	2.421	Oct 2018	-		-		-		-	0.000	21.345	-
Space Fence Design Oversight and Management	SS/FP	MIT Lincoln Laboratory : Lexington, MA	3.268	0.499	Feb 2019	-		-		-		-	0.000	3.767	-
<b>Subtotal</b>			569.158	17.599		-		-		-		-	0.000	586.757	N/A

**Remarks**  
 Prior to FY 2015 all funds were executed and reported in PE 0604425F (Space Domain Awareness Systems)  
 Product Development: \$774.994M

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test - 96th Cyberspace Test Group (CTG)	PO	96th CTG : Eglin AFB, FL	7.626	0.000		-		-		-		-	0.000	7.626	-
Test - Joint Interoperability Test Command	MIPR	Joint Interoperability Test Command : Fort Huachuca, AZ	0.241	0.039	Nov 2019	-		-		-		-	0.000	0.280	-
<b>Subtotal</b>			7.867	0.039		-		-		-		-	0.000	7.906	N/A

**Remarks**  
 Prior to FY 2015 all funds were executed and reported in PE 0604425F (Space Domain Awareness Systems)  
 Test and Evaluation: \$1.366M

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206426F / <i>Space Fence</i>	<b>Project (Number/Name)</b> 65A009 / <i>Space Fence</i>
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS	Various	Various : Various	20.128	0.461	Jan 2019	-		-		-		-	0.000	20.589	-
FFRDC	SS/FP	Various : Various	20.947	0.742	Dec 2018	-		-		-		-	0.000	21.689	-
<b>Subtotal</b>			41.075	1.203		-		-		-		-	0.000	42.278	N/A

**Remarks**  
Prior to FY 2015 all funds were executed and reported in PE 0604425F (Space Domain Awareness Systems)  
Management Services: \$68.683M

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	618.100	18.841	0.000	-	-	-	0.000	636.941	N/A

**Remarks**  
FINANCIAL PERFORMANCE: Space Fence is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, however, the Space Fence System Engineering Manufacturing and Development contract is an FPIF contract with performance based payments. 11.3% of the incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206426F / <i>Space Fence</i>	<b>Project (Number/Name)</b> 65A009 / <i>Space Fence</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Space Fence</i></b>	
Increment 1 EMD	
Development Test and Evaluation	
Initial Operational Test and Evaluation	
Initial Operational Capability (IOC) Increment 1	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206426F / <i>Space Fence</i>	<b>Project (Number/Name)</b> 65A009 / <i>Space Fence</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Space Fence</i></b>				
Increment 1 EMD	1	2019	4	2019
Development Test and Evaluation	2	2019	3	2019
Initial Operational Test and Evaluation	3	2019	4	2019
Initial Operational Capability (IOC) Increment 1	4	2019	4	2019

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206431F / <i>Advanced EHF MILSATCOM (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	139.927	117.290	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	257.217
657104: <i>MILSATCOM Space Modernization Initiative (SMI)</i>	0.000	139.927	117.290	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	257.217
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	

**Program MDAP/MAIS Code:** 261

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206431F, Advanced EHF MILSATCOM (Space) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206431SF, Advanced EHF MILSATCOM (Space) from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

The Air Force ability to deliver global satellite communications (SATCOM) is unprecedented, and the joint warfighter relies on this capability at all levels and across the range of military operations. SATCOM provides survivable communications for Presidential support and nuclear command and control, and affords national and military leaders a means to maintain strategic situational awareness and convey their intent to the Joint Force Commander (JFC). In order for the United States to maintain its asymmetric advantage of global space-based communications, the SATCOM enterprise must be prepared to "fight SATCOM" as a single enterprise through a Contested, Degraded and Operationally-limited (CDO) environment, prevent or withstand loss, and continue to deliver effects to warfighters.

The Space Modernization Initiative (SMI) strategy is to evolve current and future SATCOM systems to meet the needs of an integrated "Fighting SATCOM" Enterprise, sustain the existing AEHF system capability, develop a more affordable and resilient SATCOM enterprise capable of meeting near term and emerging requirements, demonstrate technologies and Concepts of Operations (CONOPS) that lead to a future Protected Anti-Jam Tactical SATCOM (PATs) capability that provides tactical level Military SATCOM (MILSATCOM) users protected, anti-jam satellite communications while operating in a contested environment, and develop an integrated (Commercial SATCOM (COMSATCOM and MILSATCOM) "Fighting SATCOM" Enterprise. PATs will provide tactical users significantly higher data rates than AEHF and a security architecture that enables forward deployed users to have protected satellite communications in scenarios where AEHF terminals cannot be deployed.

Under this construct the SMI will: 1) Continue the Capabilities Insertion Program (CIP) to enhance the current AEHF constellation and Protected Communications performance, and improve system operational resiliency, 2) Invest in technologies and demonstrations (e.g. Protected Tactical Service Field Demonstration (PTSFD)) that enable the future Protected Tactical Enterprise Service (PTES) and SATCOM programs by continued development of the Protected Tactical Testbed, and demonstrating resilient and affordable wideband protected technologies and CONOPS, 3) Demonstrate and develop a roadmap to evolve the current stove piped MILSATCOM Command and Control (C2) management system into an integrated "Fighting SATCOM" Enterprise, 4) Develop and demonstrate flexible terminal interface technologies with Services and SATCOM Terminal providers, and 5) Develop and demonstrate an improved integration of ground gateways and data networking with the space segment with the goal of providing seamless end to end SATCOM service for the warfighters in a CDO environment.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206431F / <i>Advanced EHF MILSATCOM (SPACE)</i>
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Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	144.753	117.290	113.469	0.000	113.469
Current President's Budget	139.927	117.290	0.000	0.000	0.000
Total Adjustments	-4.826	0.000	-113.469	0.000	-113.469
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-4.826	0.000			
• Other Adjustments	0.000	0.000	-113.469	0.000	-113.469

**Change Summary Explanation**

FY2021: Funds were transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Capabilities Insertion Program (CIP)	88.183	89.915	0.000
<b>Description:</b> Develop software that will increase the current AEHF constellation and Protected Communications capabilities, broaden overall user base, and accommodate a larger user population through improved resource utilization efficiencies. Develop modifications that will improve the Protected mission operational resiliency. Develop software to increase current AEHF terminal data rates with adaptive coding algorithms. Invest in technology demonstrations that improve the operational mission resiliency and effectiveness for all protected capabilities, which include, but are not limited to; Rapid Adaptive Planning and Situational Awareness for the Warfighter (RAPSAW), Mission Planning Element (MPE) 8.4, Cyber Defense-in-depth, etc.			
<b>FY 2020 Plans:</b>			



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206431F / <i>Advanced EHF MILSATCOM (SPACE)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Continue Advanced AEHF Capabilities Augmentation development, eXtreme Data Rate (XDR) Transition Development and Endurance Mission Re-plan to provide crypto and survivability improvements. Maintain user communication when fixed site support is unavailable, adds capability for planning downlink resources and other improvements. Complete Operational Resiliency (OR2/2B) Phase 1 4Q FY 2020. Begin OR2/2B Phase 2 (i.e., Engineering analysis and Flight software) contract award. Begin capability improvements to the AEHF system with awarding MPE 8.4; improving the wideband EHF beyond line of sight terminal (WEB-T) functionality and crypto redesign, while also closing the final six remaining CAT IU deficiency report (DR) IOC liens. Begin RAPSAW; a resiliency effort that decreases the mission planning timelines, de-conflicts communication planning for the operators, and provides enhanced situational awareness of payload and terminal resources. Invest in technology demonstrations that improve the operational mission resiliency and effectiveness for all protected capabilities. Begin development of watcher spacecraft based anomaly detection efforts. Other activities may include, but are not limited to W/V Frequency utility, combat cloud, crosslinks, etc. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>			
<p><b>Title:</b> Protected Tactical Testbed</p> <p><b>Description:</b> Protected Tactical Testbed provides a government gold standard of reference for risk reduction and experimentation on critical technology elements for the space payload, terminals and networking segments of the PATS system. Supports the hardware development of the hub component for the PTES ground system and any necessary test capabilities to support either the over-the-air (OTA) or laboratory demonstrations for the PTSFD. It enables system integration capabilities with industry and FFRDC partners for interoperability testing and conducting experiments to mature the PATS operations, with a focus on the Protected Tactical Waveform (PTW).</p> <p><b>FY 2020 Plans:</b> Complete the first phase of over the air testing with the Hub and Wideband Global SATCOM (WGS) as well as Commercial satellite assets. Complete compatibility testing between the ground testbed and Terminal Modem (TM) Line Replaceable Unit (LRU). Complete Hub capability to PTES and Protected Tactical SATCOM (PTS) risk reduction events.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>	13.441	9.450	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206431F / <i>Advanced EHF MILSATCOM (SPACE)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A				
<p><b>Title:</b> Protected Tactical Waveform (PTW) Modem Development and Demonstrations</p> <p><b>Description:</b> Develop, demonstrate, test and evaluate PTW modems and components capable of being integrated into existing Army, Air Force, and Navy tactical satellite communication terminals spanning ground, aerial, and naval environments such as the Army's Satellite Transportable Terminal (STT), the Air Force's Ground Multiband Terminal (GMT), airborne terminals, and the Navy Multiband Terminal (NMT). This includes associated End Cryptographic Unit (ECU) development, testing, National Security Agency (NSA) certification, and integration with PTW modems. Conduct trade space and requirements definition with the military Services and terminal program offices to support future PTW-related capabilities. Identify potential assets such as ground hubs and information assurance components that can be further developed by future PTW-related programs. Explore opportunities and releasability of PTW-related technologies to International Partners. PTSFD is a technology demonstration that will develop and demonstrate prototype TM LRUs utilizing PTW over wideband space/ground systems. PTSFD includes an option to demonstrate over a commercial SATCOM system and design and build the MMS simulator. The PTSFD will demonstrate an Anti-Jam (AJ) and Low Probability of Intercept (LPI)/Low Probability of Detection (LPD) communications capability that can be provided to tactical users in all Services through fielded terminals, existing wideband MILSATCOM assets, and potential COMSATCOM assets.</p> <p><b>FY 2020 Plans:</b> Complete PTSFD Modem Certification testing with Army Strategic Command (ARSTRAT). Complete PTSFD Payload Hardware Equipment Chain (PHEC) testing to verify compatibility using a WGS emulation on the ground prior to the WGS and Commercial satellite demo. Complete OTA technology demonstrations over WGS and commercial satellites for PTSFD and conduct the second Systems Integration Laboratory (SIL) test.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>		38.303	4.925	0.000
<p><b>Title:</b> Army-Air Force Anti-Jam Modem (A3M)</p> <p><b>Description:</b> The A3M will develop PTW modems that meet all environmental, integration, and mission requirements for STT and GMT tactical users. A3M development includes fabrication of pre-production modems, development of operator training materials, fielding, and sustainment planning.</p> <p><b>FY 2020 Plans:</b></p>		0.000	13.000	0.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206431F / <i>Advanced EHF MILSATCOM (SPACE)</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
A3M is not a New Start as it was previously included in the "Protected Tactical Waveform (PTW) Modem Development and Demonstrations" major thrust and funded in FY 2020 plans.  <b>FY 2021 Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	139.927	117.290	0.000

**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF 01 ADV555: <i>Advanced EHF</i>	28.329	21.894	-	-	-	-	-	-	-	0.000	50.223

**Remarks**

**E. Acquisition Strategy**  
 A3M is an ACAT III program. A3M leverages the PTSFD technology maturation resulting in a low risk development effort delivering pre-production modems with 100% production ready components. This will include certified ECUs for full scope operational and cyber testing, operator and maintainer training materials, and all required intellectual property rights, provisioning documentation, and training materials to enable swift terminal modification for operational use and sustainment. The development phase will deliver pre-production PTW capable modems ready for "build to print" production. Blended developmental and operational testing is expected to include full environmental, blue, and red team testing prior to the production decision.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206431F / <i>Advanced EHF MILSATCOM (SPACE)</i>	<b>Project (Number/Name)</b> 657104 / <i>MILSATCOM Space Modernization Initiative (SMI)</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Capabilities Insertion Program (CIP)	SS/CPIF	Lockheed Martin : Sunnyvale, CA	0.000	83.940	Jun 2019	72.766	Oct 2019	-		-		-	0.000	156.706	-
W/V Frequency utilization demonstration	MIPR	AFRL : Various	0.000	-		8.600	Nov 2019	-		-		-	0.000	8.600	-
Protected Tactical Service Field Demonstration (PTSFD)	Various	Various : Various	0.000	15.253	Oct 2018	4.395	Oct 2019	-		-		-	0.000	19.648	-
PTSFD (Modem) Contractor 1	C/CPIF	L3 : Camden, NJ	0.000	8.315	Dec 2018	1.621	Nov 2019	-		-		-	0.000	9.936	-
PTSFD (Modem) Contractor 2	C/CPIF	VIASAT : Carlsbad, CA	0.000	3.031	Dec 2018	1.509	Nov 2019	-		-		-	0.000	4.540	-
PTSFD (Modem) Contractor 3	C/CPIF	Raytheon : Marlborough, MA	0.000	8.010	Dec 2018	1.695	Nov 2019	-		-		-	0.000	9.705	-
PTSFD (Mission Management System simulator)	MIPR	Aerospace : El Segundo, CA	0.000	1.408	Nov 2018	-		-		-		-	0.000	1.408	-
Protected Tactical Testbed	Various	Various : Various	0.000	6.701	Dec 2018	9.450	Dec 2019	-		-		-	0.000	16.151	-
A3M PTW Modem Development	C/TBD	TBD : TBD	0.000	-		13.000	Jan 2020	-		-		-	0.000	13.000	-
Fighting SATCOM Enterprise	TBD	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	0.000	3.622	Nov 2018	-		-		-		-	0.000	3.622	-
Enterprise SE&I	C/CPAF	Linguest : Los Angeles, CA	0.000	6.740	Jun 2019	-		-		-		-	0.000	6.740	-
<b>Subtotal</b>			0.000	137.020		113.036		-		-		-	0.000	250.056	N/A





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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206431F / <i>Advanced EHF MILSATCOM (SPACE)</i>	<b>Project (Number/Name)</b> 657104 / <i>MILSATCOM Space Modernization Initiative (SMI)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>MILSATCOM Space Modernization Initiative</i></b>				
CIP: MPE 8.3 Endurance Mission Replan (EMR)	1	2019	3	2020
CIP: MPE 8.4 Design Release	2	2020	4	2020
CIP: Operational Resiliency - Phase 1	1	2019	4	2020
CIP: Operational Resiliency - Phase 2	2	2020	4	2020
W/V Frequency Utilization demonstration	2	2020	4	2020
Protected Tactical Testbed: Support End to End OTA Demonstration (TM LRU, MMS, PHEC)	2	2019	4	2020
A3M PTW Modem RFP, Source Selection/Contract Award	4	2019	3	2020
A3M PTW Modem SFRR, PDR, CDR	4	2020	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	349.898	25.480	412.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	787.778
654215: <i>EPS Recap</i>	0.000	0.000	412.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	412.400
657105: <i>Polar Satellite Communications</i>	349.898	25.480	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	375.378

**Program MDAP/MAIS Code:** 121

**Note**  
 In FY 2020, Project 654215, EPS Recap, efforts were transferred from PE 1206434F, Midterm Polar MILSATCOM System, Project 643720, EPS Recapitalization, in order to better align with the Enhanced Polar System (EPS) program.

**A. Mission Description and Budget Item Justification**  
 In FY 2021, PE 1206432F, Polar MILSATCOM (Space) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206432SF, Polar MILSATCOM (Space) from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

This program element acquires the Polar MILSATCOM system that provides protected communications (anti-jam and low probability of intercept and detection) for users in the North Polar Region.

In FY 2006, the DoD began funding EPS. The host spacecraft and the polar communications packages took advantage of the Advanced Extremely High Frequency (AEHF) technology including the eXtended Data Rate (XDR) waveform. The EPS Capability Development Document (CDD), approved by the Joint Requirements Oversight Council in September 2006, is based on a two-package, hosted XDR program with operational availability in CY 2015 and CY 2017. EPS is comprised of four segments: Payload, Ground Control, Gateway, and Terminal (acquired by each Service's Terminal Program Office). Milestone B review was completed April 2, 2014.

In FY 2019, the USAF and Norwegian Ministry of Defence signed the Arctic Memorandum of Agreement, which enforces the international collaboration with Norway to host two EPS-Recapitalization (EPS-R) payloads on Space Norway-procured spacecraft. Beginning FY 2020, the EPS-R effort transferred from Program Element 1206434F, Midterm Polar MILSATCOM System to Program Element 1206432F, Polar MILSATCOM (SPACE). In FY 2021, EPS-R continues to develop and acquire two Extremely High Frequency (EHF) payloads hosted on Space Norway-procured spacecraft and continues to upgrade/modify the existing EPS Ground Control and Gateway.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>
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authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Polar MILSATCOM weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

Funding in this exhibit was previously budgeted in PE 0605432F, Polar MILSATCOM (SPACE), and PE 1206434F, Midterm Polar MILSATCOM System.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	26.380	427.400	192.000	0.000	192.000
Current President's Budget	25.480	412.400	0.000	0.000	0.000
Total Adjustments	-0.900	-15.000	-192.000	0.000	-192.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-15.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.900	0.000			
• Other Adjustments	0.000	0.000	-192.000	0.000	-192.000

**Change Summary Explanation**

FY 2020: -\$15.000M Congressional Directed Reduction for prior year carryover

FY 2021: Funds were transferred from RDT&E, Air Force to RDT&E, Space Force

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 1206432F / Polar MILSATCOM (SPACE)				<b>Project (Number/Name)</b> 654215 / EPS Recap			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
654215: <i>EPS Recap</i>	0.000	0.000	412.400	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	412.400
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY 2020, Project 654215, EPS Recap, efforts were transferred from PE 1206434F, Midterm Polar MILSATCOM System, Project 643720, EPS Recapitalization, in order to better align with the Enhanced Polar System (EPS) program.

**A. Mission Description and Budget Item Justification**

This program element acquires the Polar MILSATCOM system (EPS) and the continuation effort, EPS Recapitalization (EPS-R) providing protected communications (anti-jam and low probability of intercept and detection) for users in the North Polar Region and prevents a gap in Arctic MILSATCOM coverage in the mid to late 2020s.

In FY 2018, via PE 1206434F the DoD funded EPS-R to develop and acquire 1) two Extremely High Frequency (EHF) payloads, using Advanced EHF's (AEHF's) eXtended Data Rate (XDR) waveform, on hosted spacecraft, 2) upgrades/modifications to the existing EPS Control and Planning Segment (CAPS) to provide command and control and XDR mission planning capability, and 3) upgrades/ modifications to the existing EPS Gateway to provide connectivity between polar and midlatitude users through Department of Defense Information Networks (DODIN). EPS-R will host the payloads on a Space Norway-procured bus scheduled to launch in FY 2023. EPS-R will reuse EPS Gateway and ground control elements to the greatest extent feasible.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Space Segment	0.000	367.874	0.000
<b>Description:</b> Develop and acquire two EHF payloads, using AEHF's XDR waveform, for integration on host spacecraft.			
<b>FY 2020 Plans:</b> Continue development, production, and testing of the two payloads that were initiated in FY 2018. Continue developing interface documentation and integration plans with international partner, Space Norway. Continue funding USAF share of Arctic Memorandum of Agreement (MOA) collaboration costs for hosting of the EPS-R payloads. Facilitate coordination between Space Norway, space vehicle developer, and payload contractor. Provide representation, technical expertise, and assistance at Space Norway and/or space vehicle developer facilities. Continue cyber certification efforts with the National Security Agency (NSA). Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc.			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206432F / Polar MILSATCOM (SPACE)	<b>Project (Number/Name)</b> 654215 / EPS Recap
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
N/A			
<p><b>Title:</b> Ground Updates</p> <p><b>Description:</b> Modify and upgrade the existing EPS CAPS to provide command and control and XDR mission planning capability for the two new payloads.</p> <p><b>FY 2020 Plans:</b> Continue risk reduction efforts on and upgrade EPS CAPS Segment. Conduct ground Critical Design Review. Acquire Defense Information Systems Network (DISN) lines from Schriever AFB to the Space Norway Host Ground Station to ensure out-of-command connectivity to the payload.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	0.000	36.608	0.000
<p><b>Title:</b> Gateway Updates</p> <p><b>Description:</b> Modify and upgrade the existing EPS Gateway to support the two new payloads.</p> <p><b>FY 2020 Plans:</b> Continue risk reduction efforts on EPS Gateway Segment upgrades. Continue preparations for installing a second telemetry and control terminal. Purchase additional telemetry and control terminals to recapitalize equipment that is becoming obsolete.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	0.000	7.918	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	412.400	0.000

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 1206434F: <i>Midterm Polar MILSATCOM System</i>	370.353	-	-	-	-	-	-	-	-	0.000	370.353
<b>Remarks</b>											

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>	<b>Project (Number/Name)</b> 654215 / <i>EPS Recap</i>
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**D. Acquisition Strategy**

Awarded payloads contract to Northrop Grumman Aerospace Systems (NGAS) and initiated fabrication of two EPS functional equivalent payloads in FY 2018 (PE 1206434F). In FY 2019, the USAF and Norwegian Ministry of Defence signed the Arctic Memorandum of Agreement, which enforces the international collaboration with Norway to host the two EPS-Recapitalization (EPS-R) payloads on the Space Norway-procured spacecraft. Conducted market research to identify industry capabilities and acquisition concepts. Awarded CAPS contract for EPS ground upgrade. Gateway updates will be accomplished by Naval Information Warfare Center Pacific, the EPS Gateway Segment developer. The program office initiates the procurement of a replacement terminal for the Telemetry and Command Terminal. This acquisition strategy updates the EPS Ground Segment to accommodate the EPS functional equivalent payloads and extend operations and sustainment beyond 2028. The U.S. Government will retain the system integrator role, as it was for EPS program of record.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206432F / Polar MILSATCOM (SPACE)	<b>Project (Number/Name)</b> 654215 / EPS Recap
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EPS-R Tactical Payloads 1-2	SS/CPIF	NGAS : Redondo Beach, CA	0.000	-		327.100	Nov 2019	-		-		-	0.000	327.100	409.958
Control and Planning Segment Upgrades	SS/CPIF	NGMS : Redondo Beach, CA	0.000	-		32.550	Dec 2019	-		-		-	0.000	32.550	82.320
Gateway Upgrades	Various	Various : Various, CA	0.000	-		7.040	Jan 2020	-		-		-	0.000	7.040	68.895
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	0.000	-		8.851	Dec 2019	-		-		-	0.000	8.851	-
Enterprise SE&I	C/CPAF	LinQuest : Los Angeles, CA	0.000	-		24.823	Jan 2020	-		-		-	0.000	24.823	-
<b>Subtotal</b>			0.000	-		400.364		-		-		-	0.000	400.364	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	MIPR	Aerospace : El Segundo, CA	0.000	-		2.338	Jan 2020	-		-		-	0.000	2.338	-
A&AS	Various	Various : Various	0.000	-		9.548	Jan 2020	-		-		-	0.000	9.548	-
Other Support	Various	Various : Various	0.000	-		0.150	Oct 2019	-		-		-	0.000	0.150	-
<b>Subtotal</b>			0.000	-		12.036		-		-		-	0.000	12.036	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	0.000	-	412.400	-	-	-	0.000	412.400	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>	<b>Project (Number/Name)</b> 654215 / <i>EPS Recap</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Space Segment</b>	
Payload Design/Build	██████████
International Collaboration w/ Norway	██████████
<b>Ground and Gateway Upgrades/ Modifications</b>	
Risk Reduction Activities/Studies	██████████
Ground Critical Design Review (CDR)	██████
Acquire Telemetry and Control Terminals	██████████
Upgrades/Modifications	██████████

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>	<b>Project (Number/Name)</b> 654215 / <i>EPS Recap</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Space Segment</b>				
Payload Design/Build	1	2020	4	2020
International Collaboration w/ Norway	1	2020	4	2020
<b>Ground and Gateway Upgrades/Modifications</b>				
Risk Reduction Activities/Studies	1	2020	4	2020
Ground Critical Design Review (CDR)	3	2020	4	2020
Acquire Telemetry and Control Terminals	1	2020	4	2020
Upgrades/Modifications	1	2020	4	2020



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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>	<b>Project (Number/Name)</b> 657105 / <i>Polar Satellite Communications</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
657105: <i>Polar Satellite Communications</i>	349.898	25.480	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	375.378
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This program element acquires the Polar MILSATCOM system that provides protected communications (anti-jam and low probability of intercept and detection) for users in the North Polar Region.

In FY 2006, the DoD began funding EPS. The host spacecraft and the polar communications packages took advantage of the Advanced Extremely High Frequency (AEHF) technology including the eXtended Data Rate (XDR) waveform. The EPS Capability Development Document (CDD), approved by the Joint Requirements Oversight Council in September 2006, is based on a two-package, hosted XDR program with operational availability in CY 2015 and CY 2017. EPS is comprised of four segments: Payload, Ground Control, Gateway, and Terminal (acquired by each Service's Terminal Program Office). Milestone B review was completed 2 April 2014.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Polar MILSATCOM weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> EPS	25.480	0.000	0.000
<b>Description:</b> Develop and acquire EPS MILSATCOM which consists of: 1) two Extremely High Frequency payloads, using AEHF's XDR waveform, on hosted spacecraft; 2) a standalone Control and Planning Segment (CAPS) to provide command and control and XDR mission planning capability; and 3) one gateway to provide connectivity between polar and mid-latitude users through the Global Information Grid.			
<b>FY 2020 Plans:</b> N/A.			
<b>FY 2021 Plans:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	25.480	0.000	0.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>	<b>Project (Number/Name)</b> 657105 / <i>Polar Satellite Communications</i>
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**D. Acquisition Strategy**

The EPS is the follow-on to the currently operational IPS and is a component of the Extremely High Frequency SATCOM architecture providing secure, protected communications to worldwide users. The EPS consists of four segments (Payload, Ground Control, Gateway, and Terminal) acquired by separate procurement actions. Each EPS payload and its integration onto classified host satellites was funded by the EPS program while the development and integration was performed by the host organization. The MILSATCOM Systems Directorate procured the Ground Control and Planning Segment. The Ground Gateway segment, funded by the EPS program, was organically developed by the Navy's Naval Information Warfare Center Pacific, San Diego, CA. The U.S. Air Force is the prime systems integrator for the EPS payload, ground control, and gateway segments. The Terminals that use EPS are acquired by each Service's Terminal Program Office.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206432F / Polar MILSATCOM (SPACE)	<b>Project (Number/Name)</b> 657105 / Polar Satellite Communications
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Control and Planning Segment	C/CPIF	NGMS : Redondo Beach, CA	168.519	9.868	Oct 2018	-		-		-		-	0.000	178.387	148.600
Gateway architecture development	MIPR	Space and Naval Warfare Systems Command (SPAWAR) Systems Center - Pacific : San Diego, CA	53.758	5.637	Dec 2018	-		-		-		-	0.000	59.395	75.454
EPS Design/Development Contract	SS/CPAF	NGAS : Redondo Beach, CA	11.279	3.100	Feb 2019	-		-		-		-	0.000	14.379	606.693
T&C-T Development	MIPR	Lincoln Labs : Boston, MA	11.412	1.600	Dec 2018	-		-		-		-	0.000	13.012	-
Technical Mission Analysis	Various	Various : Various	17.208	1.215	Apr 2019	-		-		-		-	0.000	18.423	-
Enterprise SE&I	Various	Various : Various	38.399	2.463	Jan 2019	-		-		-		-	0.000	40.862	-
<b>Subtotal</b>			300.575	23.883		-		-		-		-	0.000	324.458	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Planning/Management Support for T&E	MIPR	Various : Various	1.279	-		-		-		-		-	0.000	1.279	-
<b>Subtotal</b>			1.279	-		-		-		-		-	0.000	1.279	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	Various	Various : Various	19.367	0.122	Apr 2019	-		-		-		-	0.000	19.489	-
A&AS	Various	Various : Various	27.597	1.375	Jan 2019	-		-		-		-	0.000	28.972	-
Other Support	Various	Various : Various	1.080	0.100	Oct 2018	-		-		-		-	0.000	1.180	-
<b>Subtotal</b>			48.044	1.597		-		-		-		-	0.000	49.641	N/A



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>	<b>Project (Number/Name)</b> 657105 / <i>Polar Satellite Communications</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Enhanced Polar System</i></b>	
Conduct Multiservice Operational Test and Evaluation (MOT&E)	████████
IOC/FOC declaration	████
Preoperational Support/Interim Contractor Support	████████████████

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>	<b>Project (Number/Name)</b> 657105 / <i>Polar Satellite Communications</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Enhanced Polar System</i></b>				
Conduct Multiservice Operational Test and Evaluation (MOT&E)	2	2019	3	2019
IOC/FOC declaration	4	2019	4	2019
Preoperational Support/Interim Contractor Support	1	2019	4	2019

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206433F / <i>Wideband Global SATCOM (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	3.833	1.920	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.753
657102: <i>Command &amp; Control Sys-Consolidated (CCS-C)</i>	-	3.833	1.920	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.753
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The Military Satellite Communications (MILSATCOM) Command and Control System-Consolidated (CCS-C) system provides integrated launch and on-orbit command and control (C2) functionality at Schriever AFB and Vandenberg AFB for MILSATCOM satellites. Schriever AFB is used for primary operations and Vandenberg AFB is used for backup operations. CCS-C uses modified commercial off the shelf hardware/software to control emerging and legacy MILSATCOM systems including Milstar, Defense Satellite Communications System (DSCS), Wideband Global SATCOM (WGS) and Advanced Extremely High Frequency (AEHF) satellites.

The CCS-C project 657102 funds system architecture evolution to provide increased performance for additional satellites and to comply with DoD, Air Force, and Air Force Space Command (AFSPC)-directed standards for Information Assurance, Satellite Control Standardization, and Net-Readiness. This continuing effort was previously funded in the FY 2014 President's Budget and prior as an Acquisition Category II (ACAT II) program. With the 10 October 2013 Final Operational Capability (FOC) declaration, the program has transitioned to an ACAT III program, the CCS-C Assurance and Capability Enhancement (CACE), beginning FY 2014. FY 2020 will be the final year for the CACE effort. The newly enhanced CCS-C system will remain and continue to be funded with O&M funds. The WGS and AEHF procurement program elements fund the mission unique software and databases for the WGS Block II Follow-On satellites and the AEHF 4-6 satellites, respectively.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver CCS-C weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)	<b>R-1 Program Element (Number/Name)</b> PE 1206433F I Wideband Global SATCOM (SPACE)
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	3.970	1.920	0.000	0.000	0.000
Current President's Budget	3.833	1.920	0.000	0.000	0.000
Total Adjustments	-0.137	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.137	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> CCS-C development  <b>Description:</b> Develop system architecture to provide enhanced C2 of MILSATCOM satellites.  <b>FY 2020 Plans:</b> Complete Operational Testing for CACE scheduled for 3rd Qtr FY 2020 at which time CACE transitions to Sustainment. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc.  <b>FY 2021 Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A	3.833	1.920	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	3.833	1.920	0.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

Competitive contract was awarded in November 2012 and began performance in January 2013. The CCS-C Production and Sustainment Contract (CPASC) includes effort to increase the capability of the CCS-C system to provide ongoing C2, launch readiness support, and anomaly resolution for MILSATCOM satellite families. The



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	PE 1206433F / <i>Wideband Global SATCOM (SPACE)</i>

CCS-C project 657102 funds system architecture evolution to provide increased performance for additional satellites and to comply with DoD, Air Force, and AFSPC-directed standards for Information Assurance, Satellite Control Standardization, and Net-Readiness.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206433F / <i>Wideband Global SATCOM (SPACE)</i>	<b>Project (Number/Name)</b> 657102 / <i>Command &amp; Control Sys-Consolidated (CCS-C)</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>Command and Control System Consolidated (CCS-C)</b>	
Capacity Upgrade: "Wideband Capacity Capability Improvement."	
Resource Pooling:--"Processing Architecture Capability Improvement for Better Resource Management"--"Automated Data Synchronization for Increased Efficiency."	
Cryptography Upgrade: "Replace CCS-C KI-17 with KS-252"	
Secure FTP: "Cross-Domain Capability Improvement for secure data transfer"	
IA Controls: "8500 Compliance Capability Improvement for security."	
Interoperability: "Interoperability Capability Improvement to Migrate to USB standard"	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206433F / <i>Wideband Global SATCOM (SPACE)</i>	<b>Project (Number/Name)</b> 657102 / <i>Command &amp; Control Sys-Consolidated (CCS-C)</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Command and Control System Consolidated (CCS-C)</i></b>				
Capacity Upgrade: "Wideband Capacity Capability Improvement."	1	2019	4	2020
Resource Pooling:--"Processing Architecture Capability Improvement for Better Resource Management"--"Automated Data Synchronization for Increased Efficiency."	1	2019	4	2020
Cryptography Upgrade: "Replace CCS-C KI-17 with KS-252"	1	2019	4	2020
Secure FTP: "Cross-Domain Capability Improvement for secure data transfer"	1	2019	4	2020
IA Controls: "8500 Compliance Capability Improvement for security."	1	2019	4	2020
Interoperability: "Interoperability Capability Improvement to Migrate to USB standard"	1	2019	4	2020

**Note**

CCS-C upgrade started in 1Q, FY 2015.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	10,250.152	58.765	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10,308.918
653616: <i>SBIRS High Element Emd</i>	10,250.152	58.765	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10,308.917
657106: <i>EVOLVED SBIRS</i>	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001

**Program MDAP/MAIS Code:** 210

**Note**

Project 657106: The \$1K entry in FY 2020 is a database error. This project was canceled in FY 2019.

**A. Mission Description and Budget Item Justification**

The SBIRS RDT&E FY 2020 budget justification exhibits describe two elements of the SBIRS program: 1) The SBIRS Engineering and Manufacturing Development (EMD) program of record PNO 210 MDAP and 2) the Space Modernization Initiative (SMI) (non-MDAP).

1. SBIRS EMD: The Space-Based Infrared System (SBIRS) primary mission is to provide initial warning of a ballistic missile attack on the US, its deployed forces, and its allies. SBIRS enhances detection and improves reporting of intercontinental ballistic missile launches, submarine launched ballistic missile launches, and tactical ballistic missile launches. SBIRS supports Missile Defense, Battlespace Awareness, and Technical Intelligence missions by providing reliable, accurate, and timely data to Unified Combatant Commanders, Joint Task Force (JTF) Commanders, the intelligence community, and other users. SBIRS provides increased detection and tracking performance over legacy systems in order to meet requirements in Air Force Space Command's (AFSPC) Operational Requirements Document (ORD). The SBIRS system includes both space and ground elements. The space segment consists of Geosynchronous Earth Orbit (GEO) satellites, payloads hosted on satellites in Highly Elliptical Orbit (HEO), and Defense Support Program (DSP) satellites. The ground segment consists of both fixed and mobile data processing elements, communications infrastructure, and relay ground stations serving all SBIRS space elements. Four HEO payloads and four GEO satellites are on-orbit. Three of the four GEO and two of the four HEO satellites have completed AFSPC and USSTRATCOM operational acceptance and are certified for Integrated Tactical Warning/ Attack Assessment (ITW/AA) missile warning operations and technical intelligence operations. HEO-3 and HEO-4 are in a storage/residual operational mode. GEO-4 (Flight 3) is proceeding through on-orbit checkout and infrared sensor tuning following its respective launch in Jan 2017. The program of record (PoR) ground segment development exploits both the new scanner and starrer sensor data through software processing and builds user messages for missile warning and missile defense. Also, data exploitation efforts enable access to raw and processed data to expand capabilities for battlespace awareness and other applications. The baseline requirement document is the 1996 SBIRS ORD. Enterprise Systems Engineering and Integration (SE&I) provides intra- and inter-program requirements development, enterprise master planning, validation and verification, specialty engineering, and architecture development.

2. SMI: The primary objective of SMI is to enable and inform future decisions to maintain and evolve a capable, resilient, and affordable OPIR architecture by maturing technologies and mitigating risk areas to facilitate OPIR modernization within the Department's constrained resources. SMI supports the PoR by assessing future parts and material obsolescence and designing future space and ground modifications focused on affordability and capability while simultaneously maximizing

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	
<p>the effectiveness of existing system data products. SMI funds engineering activities to reduce both production and future system costs through manufacturing and producibility enhancements and through technology insertion. SMI will also mature potential technology upgrades at the component and system level for future space and ground architecture affordability and capability enhancements. The SBIRS OPIR SMI plan includes studies and risk reduction activities to evolve the current PoR SBIRS constellation, reduce production timelines, and reduce recurring production costs. Based on the outcome of these studies and technology development, the Sensor Ground Demonstration will develop capability for current, next generation sensors, processors, and algorithms. SMI funded data exploitation efforts include OPIR mission data processing (MDP), data fusion, data dissemination, algorithm development, network connectivity, efficient interfaces and sensor performance assessments to enable greater exploitation of SBIRS PoR and other data sources. SMI exploitation efforts build upon PoR capabilities and inform the PoR decision process. The data exploitation efforts identify affordable, responsive and resilient measures to improve technical intelligence and battlespace awareness processing and data dissemination tools to enhance OPIR support to the warfighters and other data users. The SMI Hosted Payloads and Wide Field of View (WFOV) Testbed activities explore technology maturation, qualification of new components, and subsystem/component prototyping to evolve the OPIR architecture. Hosted Payloads and WFOV Testbeds support maturation of MDP algorithms for tactical and strategic applications which are critical demonstration efforts to enhance PoR capabilities and to reduce program risks for future OPIR systems, whether new systems or evolutions of the PoR. Collection of on-orbit WFOV data is critical to develop algorithms to process large data sets generated by emerging large format focal planes and to reduce risk for possible SBIRS follow-on architectures. SBIRS Enterprise Ground Services (EGS) infrastructure modernization efforts under SMI will introduce Telemetry, Tracking and Command systems (TT&amp;C) and Ground Control automation, Future Operationally Resilient Ground Evolution (FORGE) MDP as well as competition into SBIRS Ground with an emphasis to on-ramp to EGS as soon as practical. SMI activities are balanced and phased to enable an expanded tradespace and improve the competitive environment.</p> <p>Space acquisition must respond with speed and agility to emerging adversary threats. Space &amp; Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver SBIRS High EMD and SMI Enterprise weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.</p> <p>This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.</p>		

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	60.565	0.000	0.000	0.000	0.000
Current President's Budget	58.765	0.001	0.000	0.000	0.000
Total Adjustments	-1.800	0.001	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-1.800	0.001	0.000	0.000	0.000

**Change Summary Explanation**

FY 2020: Database error

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>				<b>Project (Number/Name)</b> 653616 / <i>SBIRS High Element Emd</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
653616: <i>SBIRS High Element Emd</i>	10,250.152	58.765	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10,308.917
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The SBIRS primary mission is to provide initial warning of a ballistic missile attack on the US, its deployed forces, and its allies. SBIRS enhances detection and improves reporting of intercontinental ballistic missile launches, submarine launched ballistic missile launches, and tactical ballistic missile launches. SBIRS supports Missile Defense, Battlespace Awareness, and Technical Intelligence missions by providing reliable, accurate, and timely data to Unified Combatant Commanders, Joint Task Force (JTF) Commanders, the intelligence community, and other users. SBIRS provides increased detection and tracking performance over legacy systems in order to meet requirements in Air Force Space Command's (AFSPC) Operational Requirements Document (ORD). The SBIRS system includes both space and ground elements. The space segment consists of Geosynchronous Earth Orbit (GEO) satellites, payloads hosted on satellites in Highly Elliptical Orbit (HEO), and Defense Support Program (DSP) satellites. The ground segment consists of both fixed and mobile data processing elements, communications infrastructure, and relay ground stations serving all SBIRS space elements. Four HEO payloads and four GEO satellites are on-orbit and fully mission capable, having completed AFSPC and USSTRATCOM operational acceptance and are certified for Integrated Tactical Warning/ Attack Assessment (ITW/AA) missile warning operations and technical intelligence operations. HEO-1 and HEO-2 are in a storage/residual operational mode. The program of record (PoR) ground segment development exploits both the new scanner and starrer sensor data through software processing and builds user messages for missile warning and missile defense. Also, data exploitation efforts enable access to raw and processed data to expand capabilities for battlespace awareness and other applications. The baseline requirement document is the 1996 SBIRS ORD. Enterprise Systems Engineering and Integration (SE&I) provides intra- and inter-program requirements development, enterprise master planning, validation and verification, specialty engineering, and architecture development.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver SBIRS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> SBIRS EMD	58.765	-	0.000
<b>Description:</b> Continued EMD contracts for Space and Ground segment development, concept studies/activities for obsolescence issues.			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	<b>Project (Number/Name)</b> 653616 / <i>SBIRS High Element Emd</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	58.765	-	0.000

**C. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• SPAF 01 Line 13, MSSBIR: <i>SBIR High (Space)</i>	108.397	226.952	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	335.349

**Remarks**

**D. Acquisition Strategy**

The pre-SDD SBIRS contracts were competed in full and open competition. Two contracts were awarded to Lockheed/Loral/Aerojet and Hughes/TRW in 1995 for the pre-SDD phase. A single contract was awarded to Lockheed Martin in 1996 for the SDD phase. This contract is still ongoing and will incrementally deliver the ground segment. Production contracts are discussed in the procurement budget exhibits.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	<b>Project (Number/Name)</b> 653616 / <i>SBIRS High Element Emd</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Pre-EMD (LMMS & Hughes)	C/CPFF	Hughes Aircraft Company : El Segundo, CA	159.600	-		-		-		-		-	0.000	159.600	159.600
SBIRS EMD	Various	Prime: Lockheed MartinSub:Northrop Grumman : Sunnyvale; Azusa, CA	9,106.104	42.406	Jan 2019	-		-		-		-	0.000	9,148.510	9,158.709
Enterprise SE&I	C/CPAF	The Analytical Sciences Corporation : El Segundo, CA	63.958	-		-		-		-		-	0.000	63.958	64.541
SST Phase 3	C/CPAF	Not specified. : TBD	0.382	12.418	Oct 2018	-		-		-		-	0.000	12.800	-
Technology	Various	Various : Various	11.600	-		-		-		-		-	0.000	11.600	11.600
SBIRS Pre-SDD Contract Adjustment	Various	Various : Various	4.780	-		-		-		-		-	0.000	4.780	4.780
Phenomenology	Various	Various : Various	17.350	-		-		-		-		-	0.000	17.350	17.350
Technical Mission Analysis	RO	Aerospace Corp. : El Segundo, CA	15.089	-		-		-		-		-	0.000	15.089	22.794
Sensor Technology	Various	Sandia National Lab : Albuquerque, NM	13.919	-		-		-		-		-	0.000	13.919	10.000
HEO Command & Control (C2) Ground Expansion	Various	Lockheed Martin : Sunnyvale, CA	36.259	-		-		-		-		-	0.000	36.259	36.259
HEO 1/2 Residual Capability	Various	Various : Various	14.600	-		-		-		-		-	0.000	14.600	14.600
<b>Subtotal</b>			9,443.641	54.824		-		-		-		-	0.000	9,498.465	N/A

**Remarks**  
Award dates represent date of first award of the funds for that fiscal year.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	<b>Project (Number/Name)</b> 653616 / <i>SBIRS High Element Emd</i>
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<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
WFOV Testbed Concept Study	MIPR	Millennium Space Systems : El Segundo, CA	8.000	-		-		-		-		-	0.000	8.000	8.000
Program Support	Various	Various : Various	11.942	-		-		-		-		-	0.000	11.942	11.942
<b>Subtotal</b>			19.942	-		-		-		-		-	0.000	19.942	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
FFRDC	RO	Aerospace Corp. : El Segundo, CA	470.814	-		-		-		-		-	0.000	470.814	471.006
A&AS	Various	Various : Various	170.793	0.408	Dec 2018	-		-		-		-	0.000	171.201	174.682
Other Support	Various	Various : Various	144.962	3.533	Nov 2018	-		-		-		-	0.000	148.495	134.510
<b>Subtotal</b>			786.569	3.941		-		-		-		-	0.000	790.510	N/A

**Remarks**  
Award dates represent date of first award of the fiscal year.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	10,250.152	58.765	0.000	-	-	-	0.000	10,308.917	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	<b>Project (Number/Name)</b> 653616 / <i>SBIRS High Element Emd</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b><i>SBIRS High Element EMD</i></b>																												
Block 20 Integration & Test at MCSB																												
Block 20 Operational Utility Evaluation and Initial Operational Test & Evaluation with AFOTEC																												
B20 Completed and ITW/AA Certified																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	<b>Project (Number/Name)</b> 653616 / <i>SBIRS High Element Emd</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>SBIRS High Element EMD</b>				
Block 20 Integration & Test at MCSB	1	2019	2	2019
Block 20 Operational Utility Evaluation and Initial Operational Test & Evaluation with AFOTEC	2	2019	3	2019
B20 Completed and ITW/AA Certified	4	2019	4	2019

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	<b>Project (Number/Name)</b> 657106 / <i>EVOLVED SBIRS</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
657106: <i>EVOLVED SBIRS</i>	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The SBIRS primary mission is to provide initial warning of a ballistic missile attack on the US, its deployed forces, and its allies. SBIRS enhances detection and improves reporting of intercontinental ballistic missile launches, submarine launched ballistic missile launches, and tactical ballistic missile launches. SBIRS supports Missile Defense, Battlespace Awareness, and Technical Intelligence missions by providing reliable, accurate, and timely data to Unified Combatant Commanders, Joint Task Force (JTF) Commanders, the intelligence community, and other users. SBIRS provides increased detection and tracking performance over legacy systems in order to meet requirements in Air Force Space Command's (AFSPC) Operational Requirements Document (ORD). The SBIRS system includes both space and ground elements. The space segment consists of Geosynchronous Earth Orbit (GEO) satellites, payloads hosted on satellites in Highly Elliptical Orbit (HEO), and Defense Support Program (DSP) satellites. The ground segment consists of both fixed and mobile data processing elements, communications infrastructure, and relay ground stations serving all SBIRS space elements. Four HEO payloads and four GEO satellites are on-orbit and fully mission capable, having completed AFSPC and USSTRATCOM operational acceptance and are certified for Integrated Tactical Warning/ Attack Assessment (ITW/AA) missile warning operations and technical intelligence operations. HEO-1 and HEO-2 are in a storage/residual operational mode. The program of record (PoR) ground segment development exploits both the new scanner and starrer sensor data through software processing and builds user messages for missile warning and missile defense. Also, data exploitation efforts enable access to raw and processed data to expand capabilities for battlespace awareness and other applications. The baseline requirement document is the 1996 SBIRS ORD. Enterprise Systems Engineering and Integration (SE&I) provides intra- and inter-program requirements development, enterprise master planning, validation and verification, specialty engineering, and architecture development.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver SBIRS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This project was canceled in the FY 2019 PB.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> SBIRS EMD-	-	0.001	-
<b>Description:</b> Continued EMD contracts for Space and Ground segment development, concept studies/activities for obsolescence issues.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	<b>Project (Number/Name)</b> 657106 / <i>EVOLVED SBIRS</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	-	0.001	-

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Air Force</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	<b>Project (Number/Name)</b> 657106 / <i>EVOLVED SBIRS</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
N/A																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	<b>Project (Number/Name)</b> 657106 / <i>EVOLVED SBIRS</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
N/A	1	2020	1	2020

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	736.389	1,470.278	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
657009: <i>Space Mod Initiative</i>	-	152.432	205.723	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
657106: <i>Next-Gen OPIR Ground</i>	-	144.297	264.768	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
657120: <i>Next-Gen OPIR Space, Block 0 GEO</i>	-	403.481	892.383	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
657121: <i>Next-Gen OPIR Space, Block 0 Polar</i>	-	36.179	107.404	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206442F, Next Generation OPIR efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206442SF, Next Generation OPIR from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

The Next-Generation Overhead Persistent Infrared (Next-Gen OPIR) RDT&E FY 2021 budget justification exhibits describe the Next-Gen OPIR Space, Ground, and Space Modernization Initiative (SMI) programs.

1. Next-Gen OPIR Space Modernization Initiative (SMI) (Project 657009): SMI supports Next-Gen OPIR by assessing and demonstrating new technologies better enabling the detection of emerging global missile threats, material obsolescence, designing space and ground modifications focused on affordability and capability, and maximizing the effectiveness of existing system data products. SMI funds engineering activities to reduce both production and future system costs through manufacturing and producibility enhancements, and technology insertion. SMI will also mature potential technology upgrades at the component and system level for space and ground architecture enhancements. SMI includes studies and risk reduction activities to evolve the current Program of Record (PoR) constellation, reduce production timelines, and reduce recurring production costs. SMI activities are balanced and phased to enable an expanded trade space and improve the competitive environment. The three major thrust areas under SMI are Demonstrations, Technology Maturation and Data Exploitation. The Demonstrations mature and demonstrate technologies with ground and on-orbit prototypes. Demonstrations advance system performance and algorithms for tactical and strategic applications to enhance PoR capabilities. Finally, demonstrations reduce program risks for future OPIR systems, whether new systems or evolutions of the current PoR. Technology Maturation assesses and addresses needs to support resiliency of PoR assets and future architectures that must respond to an evolving threat environment. Data Exploitation enables access to OPIR data sources to expand technical intelligence and battlespace awareness processing and data dissemination tools to support warfighters and other data users.

2. Next-Gen OPIR Ground (Project 657106): Next-Gen OPIR Ground, also known as Future Operationally Resilient Ground Evolution (FORGE), will consist of Command and Control (C2) migration to Air Force Space Command's (AFSPC) Enterprise Ground Services (EGS), modernization of Mission Data Processing (MDP) to implement an open framework, and required development and/or upgrades to Relay Ground Stations (RGS) to meet AFSPC guidance on the current and future space

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	
<p>domain demands. FORGE and EGS efforts combined will provide the flexibility and scalability to integrate new satellites, sensors and capabilities more rapidly and efficiently in order to meet evolving threats and warfighter needs. The Next-Gen OPIR ground efforts enable cyber enhancements for both space and ground systems. EGS will introduce common ground services such as Telemetry, Tracking and Command (TT&amp;C), mission management, and automation. To support initial Next-Gen OPIR Space satellite launches without driving risks into the FORGE development schedule, the program will establish a risk reduction ground Next-Gen OPIR Interim Operations (NIO) capability based on a limited SBIRS Block 20 solution that can be utilized if FORGE becomes delayed.</p> <p>3. Next-Gen OPIR Space: Is a transition from the legacy SBIRS program. Next-Gen OPIR implements the direction of the Joint Requirements Oversight Council Memorandum (JROCM) 130-17, dated 21 December 2017, by developing the next generation of strategically survivable space-based missile warning OPIR platforms in both GEO and Polar orbits. This program will deliver improved core missile warning capabilities that are more survivable against emerging threats. The full Next-Gen OPIR constellation will consist of a minimum of GEO and Polar satellites in sufficient number to meet global warning coverage with no exploitable holes (5 GEO + 2 Polar) plus required backup and attrition and reconstitution reserve. The Air Force intends to acquire Next-Gen systems in block procurements. The Block 0 acquisition strategy consists of three GEO and two Polar satellites. The first GEO satellite is required no later than FY 2025 and the first Polar satellite is required in FY2027. All five Block 0 satellites need to be on orbit by FY2029. Follow-on blocks will be addressed in future acquisition strategies. Next-Gen OPIR Space, Block 0 Geosynchronous Earth Orbit (GEO)(NGG) (Project 657120): The Program Office intends to acquire the NGG capability in two contract actions. Phase 1 was awarded in August 2018 and encompasses requirements analysis, design/development, critical path flight hardware procurement, and risk reduction efforts leading to a System CDR. Phase 2 will be awarded in FY2021 for the manufacturing, assembly, system integration and test, launch and early on-orbit test through the delivery of NGG satellites 1-3 for operational acceptance of each space vehicle.</p> <p>Next-Gen OPIR Space, Block 0 Polar (NGP) (Project 657121): The Program Office intends to acquire the NGP capability in three contract actions. Phase 0 awarded in June 2018, encompassing system and payload requirements analysis and risk reduction efforts leading to a System Requirements Review. Phase 1 will be awarded for design and development, critical path flight hardware procurement, and risk reduction efforts leading to a System CDR. Phase 2 will be awarded for the manufacturing, assembly, integration and test, and delivery of NGP satellites 1&amp;2.</p> <p>Next-Gen OPIR Space, Block 1 (Project 657122): The Air Force plans to acquire subsequent blocks in a competitive environment. The Block 1 satellites will be based on the Enterprise OPIR Capability Development Document (CDD), validated by the Joint Requirements Oversight Council (JROC) in May 2019. The Next Gen OPIR Block 1 program acquisition will begin in FY 2023 in time to deliver its first satellite by FY 2030.</p> <p>Space acquisition must respond with speed and agility to emerging adversary threats. Space &amp; Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver Next-Gen OPIR weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.</p>		

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>
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This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	643.126	1,395.278	1,989.520	0.000	1,989.520
Current President's Budget	736.389	1,470.278	0.000	0.000	0.000
Total Adjustments	93.263	75.000	-1,989.520	0.000	-1,989.520
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	75.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	93.263	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-1,989.520	0.000	-1,989.520

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 657120: *Next-Gen OPIR Space, Block 0 GEO*

Congressional Add: *Congressional Add*

Congressional Add Subtotals for Project: 657120

Congressional Add Totals for all Projects

	<b>FY 2019</b>	<b>FY 2020</b>
	0.000	75.000
	0.000	75.000
	0.000	75.000

**Change Summary Explanation**

FY 2019: +\$93.263M to fund Next-Gen OPIR Space, Block 0 GEO to support 2025 launch timeline of first SV.

FY 2020: +\$75M Congressional plus-up to support Next-Gen OPIR Space, Block 0 GEO to support 2025 launch timeline of first SV.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>				<b>Project (Number/Name)</b> 657009 / <i>Space Mod Initiative</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
657009: <i>Space Mod Initiative</i>	-	152.432	205.723	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206442F, Next Generation OPIR efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206442SF, Next Generation OPIR from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

Next-Generation Overhead Persistent Infrared (OPIR) Space Modernization Initiative (SMI) (Project 657009): SMI supports Next-Gen OPIR by assessing and demonstrating new technologies to better enable detection of emerging global missile threats and awareness of material obsolescence. Additionally, SMI supports space and ground design efforts focused on delivering affordable capabilities, maximizing the effectiveness of existing system data products. SMI funds engineering activities to reduce both production and future system costs through manufacturing improvements, producibility enhancements, and technology insertion. SMI will also mature potential technology upgrades at the component and system level for space and ground architecture enhancements. SMI includes studies and risk reduction activities to evolve the current SBIRS Program of Record (PoR) constellation, reduce production timelines, and reduce recurring production costs. SMI activities are balanced and phased to enable an expanded trade space and improve the competitive environment. The three major thrust areas under SMI are Demonstrations, Technology Maturation and Data Exploitation. The Demonstrations mature and demonstrate technologies with ground and on-orbit prototypes. Demonstrations advance system performance and algorithms for tactical and strategic applications to enhance PoR capabilities. Finally, demonstrations reduce program risks for future OPIR systems, whether new systems or evolutions of the current PoR. Technology Maturation assesses and addresses needs to support resiliency of PoR assets and future architectures that must respond to an evolving threat environment. Data Exploitation enables access to OPIR data sources to expand technical intelligence products, battlespace awareness processing, and data dissemination tools to support warfighters and other data users.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Demonstrations	105.600	113.838	0.000	-	0.000
<b>Description:</b> Demonstrations mature and demonstrate OPIR technologies with ground and on-orbit prototypes advance system performance, algorithms, and resiliency for future OPIR systems. The demonstrations explore technology maturation, qualification of new components, and subsystem/component prototyping to evolve the OPIR architecture. The demonstrations support maturation of Mission Data Processing (MDP) algorithms for tactical and strategic applications which are critical efforts to enhance PoR capabilities and to reduce program risks for future OPIR systems.					
The Wide Field Of View (WFOV) demonstration matures WFOV technology and validates multi-mission capabilities including the potential for a single sensor to simultaneously perform strategic and tactical missions. WFOV is ready for launch in FY 2021. Collection of on-orbit WFOV data is critical to develop algorithms to					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657009 / <i>Space Mod Initiative</i>
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**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>process large data sets generated by emerging large format focal planes and reduce risk for future architectures. The WFOV payload and bus are separate development efforts. The WFOV testbed program provides a bus capable of demonstrating on-orbit mission performance and mitigating the development risks for employing WFOV sensors. The testbed program will integrate, test, and launch a prototype WFOV payload with a government-owned free-flyer spacecraft. The WFOV testbed will host the WFOV payload. As an integrated Space Vehicle, the WFOV system will prove on-orbit mission performance of WFOV sensors. The WFOV payload will provide the critical on-orbit data required to develop and validate WFOV algorithms, as well as on-board MDP throughput requirements for strategic missile warning.</p> <p>The Block 1 Prototype (space vehicle) is under development and will be responsive to emerging missile types and threats to the current missile warning architecture as well as evolving threats to the enterprise. The Block 1 Prototype will inform future OPIR architecture to include those achieved by the Space Force, Missile Defense Agency (MDA), and other mission partners. The Block 1 Prototype has a Class-C mission assurance with a 3-5 year designed mission life. The Block 1 Prototype is targeting an initial launch capability beginning in 2025. The technology demonstrations will incorporate resiliency capabilities while advancing the state of the art performance technology. The demonstrations will focus on the rapid advancement, technology insertion, and launch of future generations of missile warning technologies. These assets will incorporate threat mitigation technologies and other resiliency features with the goal of demonstrating these technologies in ground and on-orbit. These demonstrations will facilitate tech insertion, validate technical performance, inform future OPIR requirements, and reduce technical risk to the enterprise.</p> <p><b>FY 2020 Plans:</b> Continue support of WFOV Space Vehicle maintenance and storage. Complete any remaining integrated WFOV Space Vehicle end-to-end test and maintenance. Continue Systems Engineering, Integration and Test (SEIT) activities including pre-launch preparations and mission operations planning. Finalize launch service integration campaign. Block 1 Prototype will hold a System Requirements Review and execute option for up to five contractors culminating in a tailored Preliminary Design Review (PDR). The Block 1 Prototype effort will continue to mature the ground integration plan. This will entail development of engineering models for resiliency ground demonstration in a sensor test bed and procurement of long lead items. Additionally, program office and other related support activities (studies, technical analysis, prototyping, etc.) will be continued.</p> <p><b>FY 2021 Base Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657009 / <i>Space Mod Initiative</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
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N/A					
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<b>Title:</b> Technology Maturation	10.053	32.118	0.000	0.000	0.000
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**Description:** Assess technology needs to support resiliency of PoR assets and future architectures that are responsive to the evolving threat environment. Perform trade and design studies to assess obsolescence, affordability, capability design modifications, and CONOPS for the OPIR mission. Mature technologies and manufacturability to reduce cost, schedule, and technical risk for new component and subsystem designs that may be used in the future systems. Mature technologies including algorithms, Focal Plane Arrays (FPA), optical filters, on-board processors, auxiliary resiliency payloads, and other payload components for future missile warning satellites, and reconstitution capabilities. Develop modeling and simulation (M&S) capabilities, and engineering model prototypes for hardware/software integration and testing. These efforts will reduce risk and mature technologies applicable to future systems and architectures. Additionally, develop a sensor ground test bed incorporating M&S software, breadboards/brassboards, test equipment, and data reduction software to provide an evaluation capability for prototype systems and hardware. The test bed will validate/verify requirements and ensure technical maturity for next-gen payload technologies as well as threat mitigation components and techniques.

**FY 2020 Plans:**  
Continue prototyping resilient hardware and maturing critical technologies that include large format FPAs, resilient FPAs, resilient processing algorithms, pointing mirrors, threat sensors, and processors for earliest integration into Next-Gen OPIR or similar programs. Continue to develop technology options to address emerging threats and stressing targets to current and future OPIR systems. Continue to develop and space qualify emerging technologies to reduce risk for Next-Gen OPIR satellites. Continue to develop system resiliency and advanced technology concepts via ground and on-orbit demonstrations to validate performance, develop CONOPS, and prove enhanced system capabilities. Continue the integration of sensor test bed components and resiliency tests in sensor ground test bed. Begin maturation of sensor and bus modularity concepts.

**FY 2021 Base Plans:**  
N/A

**FY 2021 OCO Plans:**  
N/A

**FY 2020 to FY 2021 Increase/Decrease Statement:**



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657009 / <i>Space Mod Initiative</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
N/A					
<p><b>Title:</b> Data Exploitation</p> <p><b>Description:</b> Data exploitation efforts will exploit existing OPIR data sources including Defense Support Program (DSP), SBIRS Highly Elliptical Orbit (HEO), SBIRS GEO Scanner, SBIRS GEO Starer, prototypes, and other sources. Efforts will exploit data through collection, processing, fusion, data dissemination, algorithm development and testing, network connectivity, and sensor performance assessments. SBIRS and other sensors provide a rich data set for exploitation. SMI data exploitation enables access to raw and processed data for data analysts and application developers to expand capabilities for battlespace awareness and other applications. SMI data exploitation efforts are complementary to, and enhance, the exploitation capabilities delivered by the PoR and prototypes. SMI will develop tools and algorithms to enable users to apply OPIR data to support their mission needs. Data exploitation efforts also evaluate tools for C2, mission management, and MDP to reduce risk. Data exploitation efforts evolve the PoR ground system to an open architecture that could support PoR and other future satellite alternatives. SMI ground system development activities seek to demonstrate the performance of an evolved ground system architecture capable of supporting multiple satellites, payloads, and missions through management and data processing. These efforts seek to lower operating costs with enhanced net-centric and service oriented features with a new flexible expansion capability. Data exploitation efforts support demonstration and prototype architecture planning and experimentation.</p> <p><b>FY 2020 Plans:</b> Continue to provide enhanced ground segment capability and tools for C2, data collection, mission processing, and data dissemination to enhance mission resiliency and data exploitation of SBIRS and other OPIR data. Continue to collaborate with Intelligence Community (IC) and MDA to enhance Joint OPIR Ground (JOG) study initiatives. Complete building and expansion of data exploitation lab capability into its final location. Support experimentation, technology maturity, and evolution of exploitation algorithms. Continue development and expansion of a Battlespace Awareness real-time capability in the OPIR Battlespace Awareness Center (OBAC). Integrate applications and services matured in the data exploitation government lab. Continue to develop, expand, and manage the common open framework architecture of the data exploitation lab and real-time OBAC capability. Support development of experimental operations and additional uses of the program of record data in the OBAC. Develop prototype processes for managing an open framework architecture. Develop applications for the OBAC and transition those processes to Future Operationally Resilient Ground Evolution (FORGE). Develop and demonstrate the performance of a Government owned open and extensible evolved ground system architecture to support multiple satellites, payloads, and missions. Demonstrate data processing for any infrared payload with enhanced net-centric and service oriented features with a flexible expansion</p>	36.779	59.767	0.000	0.000	0.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657009 / <i>Space Mod Initiative</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
capability. Incorporate results from WFOV payload calibration into WFOV MDP software. Develop and test WFOV calibration algorithms and execute the WFOV on-orbit calibration. Support demonstration and prototype architecture planning and experimentation.					
<b>FY 2021 Base Plans:</b> N/A					
<b>FY 2021 OCO Plans:</b> N/A					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A					
<b>Accomplishments/Planned Programs Subtotals</b>	152.432	205.723	0.000	0.000	0.000

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• SPAF 01 Line 13: <i>MSSBIR: SBIR High (Space)</i>	108.397	233.952	-	-	-	-	-	-	-	-	Continuing Continuing
• RDTE 05 1206441F: <i>Space Based Infrared System (SBIRS) High EMD</i>	60.565	-	-	-	-	-	-	-	-	0.000	60.565

**Remarks**

**D. Acquisition Strategy**  
The program office will use a variety of acquisition approaches to execute various concept studies, technology maturation efforts, testbed/prototype demonstrations, and data exploitation initiatives and projects. The program office will collaborate with appropriate contracting agencies to support each individual effort. Data exploitation efforts in the laboratory and the Battlespace Awareness center will leverage existing external contracts, as well as new internal competitive contracts. Activities, such as SBIRS obsolescence and affordability enhancements to the existing satellite design, will leverage existing Program of Record contracts. Technology maturation and component prototyping and/or qualification could leverage existing contracts. Broad Agency Announcements (BAAs) and Other Transaction Authorities are planned in collaboration with Air Force Research Lab (AFRL) and other government agencies. Where practical, other efforts are competed. An SMC BAA will be used to acquire and mature high priority technology items. Federally Funded Research and Development Center (FFRDC), University Affiliated Research Centers (UARCs), and Systems Engineering and Technical Assistance (SETA) contractors will also be used to conduct and support studies. New technology, replacement components, and system designs will be acquired with government data rights to the maximum extent, allowing incorporation into future OPIR satellite production or system development. Contracting partnerships with other agencies will also be used to study, develop, demonstrate, and prove emerging capabilities. Funding in execution years will be

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>	<b>Project (Number/Name)</b>
3600 / 5	PE 1206442F / <i>Next Generation OPIR</i>	657009 / <i>Space Mod Initiative</i>

realigned within the Next-Gen OPIR program element to respond to execution requirements. To accelerate contracting actions and program execution, a local SMC contract vehicle will be utilized for the OPIR Battlespace Awareness Center (OBAC) and government lab services.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / Next Generation OPIR	<b>Project (Number/Name)</b> 657009 / Space Mod Initiative
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Demonstrations	Various	Various : Various	-	67.451	Dec 2018	91.796	Jan 2020	0.000		-		0.000	Continuing	Continuing	-
Technology Maturation	Various	Various : Various	-	10.053	Jan 2019	32.118	Jan 2020	0.000		-		0.000	Continuing	Continuing	-
Data Exploitation	Various	Various : Various	-	36.779	Jan 2019	59.767	Jan 2020	0.000		-		0.000	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace : El Segundo, CA	-	8.493	Oct 2018	8.095	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	122.776		191.776		0.000		-		0.000	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
FFRDC	Various	Various : Various	-	4.565	Dec 2018	5.018	Dec 2019	0.000		-		0.000	Continuing	Continuing	-
A&AS	Various	Various : Various	-	3.820	Feb 2019	2.371	Jan 2020	0.000		-		0.000	Continuing	Continuing	-
Other Support	Various	Various : Various	-	21.271	Jan 2019	6.558	Jan 2020	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	29.656		13.947		0.000		-		0.000	Continuing	Continuing	N/A

<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
-	152.432	205.723	0.000	-	0.000	Continuing	Continuing	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657009 / <i>Space Mod Initiative</i>
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	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Demonstrations - WFOV Testbed</i></b>	
Payload Calibration	██████████
Space Vehicle Integration & Test	██████████
<b><i>Demonstrations - Block 1 Prototype</i></b>	
Development	████████████████████
<b><i>Technology Maturation</i></b>	
BAA White Papers & Proposed Review	██████████
BAA Awards (annual calls)	██████████
Architecture Studies	██████████
Component design & test	████████████████████
<b><i>Data Exploitation</i></b>	
BAA Follow-on	████████████████████
Government Lab & OBAC Support Services	████████████████████

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657009 / <i>Space Mod Initiative</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Demonstrations - WFOV Testbed</i></b>				
Payload Calibration	1	2019	3	2019
Space Vehicle Integration & Test	1	2019	3	2019
<b><i>Demonstrations - Block 1 Prototype</i></b>				
Development	3	2019	4	2020
<b><i>Technology Maturation</i></b>				
BAA White Papers & Proposed Review	1	2019	2	2019
BAA Awards (annual calls)	2	2020	4	2020
Architecture Studies	2	2020	3	2020
Component design & test	1	2019	4	2020
<b><i>Data Exploitation</i></b>				
BAA Follow-on	1	2019	4	2020
Government Lab & OBAC Support Services	4	2019	4	2020

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>				<b>Project (Number/Name)</b> 657106 / <i>Next-Gen OPIR Ground</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
657106: <i>Next-Gen OPIR Ground</i>	-	144.297	264.768	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206442F, Next Generation OPIR efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206442SF, Next Generation OPIR from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

Next-Gen OPIR Ground (Project 657106): Next-Gen OPIR Ground, also known as Future Operationally Resilient Ground Evolution (FORGE), will consist of Command and Control (C2) migration to US Space Force (USSF) HQ's Enterprise Ground Services (EGS), modernization of Mission Data Processing (MDP) to implement an open framework, and required development and/or upgrades to Relay Ground Stations (RGS) to meet USSF HQ guidance on the current and future space domain demands. FORGE and EGS efforts combined will provide the flexibility and scalability to integrate new satellites, sensors and capabilities more rapidly and efficiently in order to meet evolving threats and warfighter needs. The Next-Gen OPIR ground efforts enable cyber enhancements for both space and ground systems. EGS will introduce common ground services such as Telemetry, Tracking, and Command (TT&C); mission management; and automation. To support initial Next-Gen OPIR Space satellite launches without driving risks into the FORGE development schedule, the program will establish a risk reduction ground Next-Gen OPIR Interim Operations (NIO) capability based on a limited Space Based Infrared System (SBIRS) Block 20 solution.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Next-Gen OPIR Ground	144.297	264.768	0.000	0.000	0.000
<b>Description:</b> Infrastructure modernization and implementation of a Government owned open framework for MDP, migration for C2 of satellite operations onto EGS, and required development and/or upgrades to Relay Ground Stations (RGS).					
<b>FY 2020 Plans:</b> Award competitive MDP Applications Provider (MDPAP) prototypes that will utilize the FORGE MDP Applications Framework (MDPAF). Downselect MDPAF prototype contractors and award a single Other Transaction (OT) development contract. Continue work on first Geosynchronous Earth Orbit (GEO) C2 transition to EGS. Continue work on Next-Gen GEO ground software development for integration into EGS and FORGE MDP. Assess need for continued development of Next-Gen Interim Operations (NIO) risk reduction effort. Continue accelerated FORGE activity for RGS design and build out. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. These activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc.					
<b>FY 2021 Base Plans:</b>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657106 / <i>Next-Gen OPIR Ground</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A					
<b><i>FY 2021 OCO Plans:</i></b>					
N/A					
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b>					
N/A					
<b>Accomplishments/Planned Programs Subtotals</b>	144.297	264.768	0.000	0.000	0.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Next Gen OPIR Ground program has been declared a Section 804 Rapid Prototype effort under the 2016 National Defense Authorization Act (NDAA), effective December 2019. Up to this point, FORGE has utilized existing Space and Missile Systems Center (SMC) contracts to transition SBIRS C2 satellite operations to EGS. SMC intends to compete a MDP framework provider and MDP applications provider via Other Transaction Authority (OTA). EGS infrastructure modernization and FORGE MDP will introduce competition into OPIR ground systems with an emphasis to on ramp to EGS as soon as practical. NIO is being acquired as part of the Next-Gen GEO Block 0 contract. RGS(s) will be developed utilizing a combination of existing and future contracts using competitive processes whenever possible.



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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / Next Generation OPIR	<b>Project (Number/Name)</b> 657106 / Next-Gen OPIR Ground
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Next-Gen OPIR Ground	Various	Various : Various	-	104.385	Oct 2018	224.998	Oct 2019	-		-		-	Continuing	Continuing	-
FORGE-EGS/C2	TBD	TBD : TBD	-	-		-		0.000		-		0.000	Continuing	Continuing	-
FORGE - MDP	TBD	TBD : TBD	-	-		-		0.000		-		0.000	Continuing	Continuing	-
Next Gen Interim Operations (NIO) (Risk Reduction Option)	TBD	TBD : TBD	-	-		-		0.000		-		0.000	Continuing	Continuing	-
Relay Ground Stations (RGS)	TBD	TBD : TBD	-	-		-		0.000		-		0.000	Continuing	Continuing	-
Enterprise SE&I	C/CPAF	Engility Corp. : Andover, MA	-	9.168	Nov 2018	6.000	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corporation : El Segundo, CA	-	9.453	Jan 2019	8.306	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	123.006		239.304		0.000		-		0.000	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
FFRDC	RO	Aerospace Corporation : El Segundo, CA	-	3.113	Jan 2019	5.481	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
A&AS	Various	Various : Various	-	13.021	Feb 2019	14.688	Feb 2020	0.000		-		0.000	Continuing	Continuing	-
Other Support	Various	Various : Various	-	5.157		5.295	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	21.291		25.464		0.000		-		0.000	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
<b>Project Cost Totals</b>		-	144.297	264.768	0.000	-	0.000	Continuing	Continuing	N/A



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**Exhibit R-4, RDT&E Schedule Profile: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657106 / <i>Next-Gen OPIR Ground</i>
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FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>FORGE - EGS/C2</b>	
SBIRS HEO 1 & 2 Development	
1 SBIRS GEO on EGS	
Next-Gen OPIR GEO	
<b>FORGE - MDP</b>	
Competitive Prototype Framework Development	
Next-Gen OPIR GEO MDP Development Sensor Specific Processing (SSP) and Verification & Validation (V&V)	
Competitive Prototype Applications Provider	
Follow-on Prototype Framework Development	
<b>Next-Gen Interim Operations (NIO) (Risk Reduction Option)</b>	
NIO Development	
<b>Relay Ground Stations (RGS)</b>	
RGS Development	

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657106 / <i>Next-Gen OPIR Ground</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>FORGE - EGS/C2</i></b>				
SBIRS HEO 1 & 2 Development	1	2019	2	2020
1 SBIRS GEO on EGS	3	2020	4	2020
Next-Gen OPIR GEO	1	2019	4	2020
<b><i>FORGE - MDP</i></b>				
Competitive Prototype Framework Development	1	2019	3	2020
Next-Gen OPIR GEO MDP Development Sensor Specific Processing (SSP) and Verification & Validation (V&V)	2	2019	4	2020
Competitive Prototype Applications Provider	3	2020	4	2020
Follow-on Prototype Framework Development	3	2020	4	2020
<b><i>Next-Gen Interim Operations (NIO) (Risk Reduction Option)</i></b>				
NIO Development	1	2019	4	2020
<b><i>Relay Ground Stations (RGS)</i></b>				
RGS Development	3	2020	4	2020

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 1206442F / Next Generation OPIR				<b>Project (Number/Name)</b> 657120 / Next-Gen OPIR Space, Block 0 GEO			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
657120: Next-Gen OPIR Space, Block 0 GEO	-	403.481	892.383	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206442F, Next Generation OPIR efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206442SF, Next Generation OPIR from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

Next-Generation Overhead Persistent Infrared (Next-Gen OPIR) Space Block 0 Geosynchronous Earth Orbit (GEO) (Project 657120): The primary mission is to provide initial missile warning of a ballistic missile attack on the US, deployed forces and allies. The Next-Gen OPIR GEO (NGG) missile warning satellites enhance detection and improve reporting of intercontinental ballistic missile launches, submarine ballistic missile launches, and tactical ballistic missile launches. Development consists of new payloads in a highly resilient bus, providing real-time persistent global infrared coverage to meet validated Joint Requirements Oversight Council (JROC) requirements on current and future space domain demands.

The Program Office intends to acquire the NGG capability in two contract actions. Phase 1 awarded in August 2018 encompasses requirements analysis, design/development, critical path flight hardware procurement, and risk reduction efforts leading to a System Critical Design Review (CDR). Phase 2 will be awarded in FY 2021 for the manufacturing, assembly, system integration and test, launch, and early on-orbit test through operational acceptance of NGG satellites 1-3.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Next-Gen OPIR Space, Block 0 GEO	403.481	817.383	0.000	0.000	0.000
<b>Description:</b> Development of the Next-Gen OPIR GEO missile warning satellites with a proven bus, new hardened sensors, and auxiliary payloads for increased resilience. The space segment for GEO missile warning satellites consist of a resilient architecture providing real time persistent global equatorial infrared coverage. The first GEO satellite is required in FY 2025.					
<b>FY 2020 Plans:</b> Will continue to perform requirements analysis, design/development, critical path flight hardware procurement, and risk reduction efforts leading to a System CDR for GEO satellites. Continue maturing payload design and resiliency related re-design of the Lockheed Martin Space (LMS) A2100 Tech Refresh Space Vehicle (SV). Mature the Preliminary Design Review level design into a detailed design for a SV CDR and System CDR by FY2021. Reduce risks and purchase the remaining critical flight components. Rapidly respond to implement					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / Next Generation OPIR	<b>Project (Number/Name)</b> 657120 / Next-Gen OPIR Space, Block 0 GEO

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
system resiliency and situational awareness necessary to operate in the contested space domain. These activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc.  <b>FY 2021 Base Plans:</b> N/A  <b>FY 2021 OCO Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A					
<b>Accomplishments/Planned Programs Subtotals</b>	403.481	817.383	0.000	0.000	0.000

	<b>FY 2019</b>	<b>FY 2020</b>
<b>Congressional Add:</b> Congressional Add  <b>FY 2019 Accomplishments:</b> N/A  <b>FY 2020 Plans:</b> FY 2020 Congressional Add of \$75M supports Block 0 GEO effort to deliver first Satellite Vehicle by 2025. Specific efforts are provided in Next-Gen OPIR Space, Block 0 GEO Major Thrust.	0.000	75.000
<b>Congressional Adds Subtotals</b>	0.000	75.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Space Force intends to acquire Next-Gen systems in block developments to deliver the required constellation. The first block, Block 0, consists of 3 Next-Gen GEO and 2 Next-Gen Polar satellites. The Next-Gen OPIR Space program has been declared a Section 804 Rapid Prototype effort under the 2016 National Defense Authorization Act (NDAA). The first GEO satellite is required by FY 2025 and the first Polar satellite is required in FY 2027. All five Block 0 satellites need to be on orbit by FY 2029. The program office awarded two sole source contracts (one to a GEO prime and one to a Polar prime) under the authority of two Justification & Authorization documents. Next-Gen GEO Phase 1 was awarded in FY 2018, encompassing requirements analysis, design/development, critical path flight hardware procurement, and risk reduction efforts leading to a System Critical Design Review for SV #1. Next-Gen GEO Phase 2 will be awarded in FY 2021 as a modification to the Phase 1 contract. This will include material buys for SV #2 and #3, as well as complete the manufacturing, assembly, system integration and test, launch, and early on-orbit test through the delivery of GEOs 1-3 for operational acceptance of each space vehicle. The Space Force plans to acquire subsequent blocks in a competitive

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657120 / <i>Next-Gen OPIR Space, Block 0 GEO</i>

environment. The Block 1 satellites will be based on the Missile Warning and Missile Defense OPIR Capability Development Document (CDD), validated by the Joint Requirements Oversight Council (JROC) in May 2019. Funding in execution years will be realigned within the Next-Gen OPIR program element to respond to execution requirements.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / Next Generation OPIR	<b>Project (Number/Name)</b> 657120 / Next-Gen OPIR Space, Block 0 GEO
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Next-Gen OPIR Space, Block 0 GEO	SS/CPIF	Lockheed Martin : Sunnyvale, CA	-	372.272	Oct 2018	841.700	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
Enterprise SE&I	C/CPAF	Engility Corp. : El Segundo, CA	-	5.672	Nov 2018	8.491	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corp. : El Segundo, CA	-	7.695	Jan 2019	9.699	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	385.639		859.890		0.000		-		0.000	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
FFRDC	RO	Aerospace Corp. : El Segundo, CA	-	2.534	Oct 2018	3.194	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
A&AS	Various	Various : Various	-	10.441	Feb 2019	12.374	Feb 2020	0.000		-		0.000	Continuing	Continuing	-
Other Support	Various	Various : Various	-	4.867	Oct 2018	16.925	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	17.842		32.493		0.000		-		0.000	Continuing	Continuing	N/A

<b>Project Cost Totals</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
	-	403.481	892.383	0.000	-	0.000	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657120 / <i>Next-Gen OPIR Space, Block 0 GEO</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Phase 1</b>																												
Bus Development																												
SRR																												
SV PDR																												
SV 1 Critical Path Flight Hardware																												
Payload Development																												
Payload PDR																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657120 / <i>Next-Gen OPIR Space, Block 0 GEO</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Phase 1</b>				
Bus Development	1	2019	4	2020
SRR	2	2019	2	2019
SV PDR	4	2019	4	2019
SV 1 Critical Path Flight Hardware	1	2020	4	2020
Payload Development	1	2019	4	2020
Payload PDR	2	2020	2	2020

**Note**

Next-Gen OPIR Space, Block 0 GEO efforts continue past 2020.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 5					<b>R-1 Program Element (Number/Name)</b> PE 1206442F / Next Generation OPIR				<b>Project (Number/Name)</b> 657121 / Next-Gen OPIR Space, Block 0 Polar			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
657121: Next-Gen OPIR Space, Block 0 Polar	-	36.179	107.404	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206442F, Next Generation OPIR efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206442SF, Next Generation OPIR from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

Next-Generation Overhead Persistent Infrared (OPIR) Space, Block 0 Polar (NGP) (Project 657121): The primary mission is to provide initial missile warning of a ballistic missile attack on the US, its deployed forces, and its allies. Next-Gen OPIR Space enhances detection and improves reporting of intercontinental ballistic missile launches, submarine launched ballistic missile launches, and tactical ballistic missile launches. Development consists of the Next-Gen OPIR Polar missile warning satellites with new payloads in a highly resilient bus, providing real-time persistent global infrared coverage to meet validated Joint Requirements Oversight Council (JROC) requirements on current and future space domain demands.

The Program Office intends to acquire the NGP capability in three contract actions. Phase 0 awarded in June 2018, encompasses system requirements analysis and risk reduction efforts leading to a System Requirements Review (SRR). Phase 1 will be awarded for design and development, critical path flight hardware procurement, and risk reduction efforts leading to a System Critical Design Review (CDR). Phase 2 will be awarded for the manufacturing, assembly, integration and test, and early on-orbit test, through operational acceptance of NGP satellites 1 and 2.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Next-Gen OPIR Space, Block 0 Polar	36.179	107.404	0.000	0.000	0.000
<b>Description:</b> Development of the Next-Gen OPIR Polar missile warning satellites using a proven bus with modifications, auxiliary payloads for improved resiliency, and new hardened sensors. The Polar space segment will consist of two Next-Gen OPIR Polar satellites in a resilient architecture, providing real time persistent infrared coverage of the northern hemisphere.					
<b>FY 2020 Plans:</b> Continue maturing payload and bus requirements for satellite systems that meet new missile warning requirements balancing affordability, capability, and resiliency requirements. Conduct SRR and begin preliminary design in preparation for Preliminary Design Review. Award follow-on contract for design, long lead parts procurement, development, and risk reduction efforts leading to system CDR. Rapidly respond to incorporate					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657121 / <i>Next-Gen OPIR Space, Block 0 Polar</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
system resiliency and situational awareness requirements necessary to operate in the contested space domain. These activities may include, but are not limited to program office support, studies, technical analysis, prototyping etc.  <b>FY 2021 Base Plans:</b> N/A  <b>FY 2021 OCO Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A					
<b>Accomplishments/Planned Programs Subtotals</b>	36.179	107.404	0.000	0.000	0.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

The Space Force intends to acquire Next-Gen systems in block developments to deliver the required constellation. The first block, Block 0, consists of three Next-Gen Geosynchronous Earth Orbit (GEO) and two Next-Gen Polar satellites. The Next-Gen OPIR Space program has been declared a Section 804 Rapid Prototype effort under the 2016 National Defense Authorization Act (NDAA). The first GEO satellite is required by FY2025, and the first Polar satellite is required in FY2027. All five Block 0 satellites need to be on orbit by FY2029. The program office awarded two sole source contracts (one to a GEO prime and one to a Polar prime) under the authority of two Justification & Authorization documents. The Next-Gen Polar Phase 0 was awarded in FY 2018, consisting of requirements development and culminates in a FY 2020 SRR. Phase 1 will be awarded in FY 2020, encompassing requirements review, design, development, critical path flight hardware procurement, and risk reduction efforts leading to a System CDR for Next-Gen Polar Satellite Vehicles (SV) 1 and 2. Phase 2 will be awarded in FY 2022, encompassing build, integration, test, launch, and transition to operations for Next-Gen Polar SVs 1 and 2. The Space Force plans to acquire subsequent blocks in a competitive environment. The Block 1 satellites will be based on the Missile Warning and Missile Defense OPIR Capability Development Document (CDD), validated by the Joint Requirements Oversight Council (JROC) in May 2019. Funding in execution years will be realigned within the Next-Gen OPIR program element to respond to execution requirements.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / Next Generation OPIR	<b>Project (Number/Name)</b> 657121 / Next-Gen OPIR Space, Block 0 Polar
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<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
Next-Gen OPIR Space, Block 0 Polar	SS/CPAF	Northrop Grumman : Redondo Beach, CA	-	25.710	Oct 2018	91.124	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
Enterprise SE&I	C/CPAF	Engility Corp. : El Segundo, CA	-	1.441	Nov 2018	2.674	Nov 2019	0.000		-		0.000	Continuing	Continuing	-
Technical Mission Analysis	RO	Aerospace Corp. : El Segundo, CA	-	4.123	Jan 2019	4.718	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	31.274		98.516		0.000		-		0.000	Continuing	Continuing	N/A

<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Management Services	C/CPAF	Not specified. : TBD	-	-		-		-		-		-	Continuing	Continuing	-
FFRDC	RO	Aerospace Corp. : El Segundo, CA	-	1.358	Oct 2018	1.554	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
A&AS	Various	Various : Various	-	2.335	Feb 2019	5.186	Feb 2020	0.000		-		0.000	Continuing	Continuing	-
Other Support	Various	Various : Various	-	1.212	Oct 2018	2.148	Oct 2019	0.000		-		0.000	Continuing	Continuing	-
<b>Subtotal</b>			-	4.905		8.888		0.000		-		0.000	Continuing	Continuing	N/A

<b>Project Cost Totals</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>	-	36.179	107.404	0.000	-	0.000	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206442F / <i>Next Generation OPIR</i>	<b>Project (Number/Name)</b> 657121 / <i>Next-Gen OPIR Space, Block 0 Polar</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Phase 0</b>				
Requirements Development & Analysis	1	2019	3	2020
SRR	2	2020	2	2020
<b>Phase 1</b>				
Phase 1 ATP	2	2020	2	2020
Payload & Bus Development	3	2020	4	2020

**Note**

Next-Gen OPIR Polar efforts continue past 2025

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206445F / <i>Commercial SATCOM (COMSATCOM) Integration</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	47.869	5.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	52.869
650140: <i>COMSATCOM</i>	-	47.869	5.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	52.869
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

The subject Research, Development, Test and Evaluation (RDT&E) funds will be executed from Headquarters United States Space Force (USSF) and will be used to advance mission-critical COMSATCOM capabilities, thereby enabling transformation of USSF's SATCOM enterprise by ensuring RDT&E investments have utility and portability between Military SATCOM (MILSATCOM) and COMSATCOM requirements. These activities include: COMSATCOM financial and customer tools development and migration from the Defense Information Systems Agency (DISA) to Space Force systems; development of transformative COMSATCOM acquisition capabilities; enterprise innovation development activities focused on evolving and integrating the four principle layers of a SATCOM service - space, terminal, network, and management and control - as well as governance structures needed to normalize enterprise capabilities; and RDT&E of innovative and emerging technology and capabilities, including proliferated Low Earth Orbit (LEO) systems.

The Space Force has determined that an enterprise approach to the procurement, delivery, and management of its SATCOM capabilities is the best means to create an environment that is responsive to Combatant Commanders and other users across the spectrum of conflict. In addition, an enterprise approach will improve affordability and mission assurance. The COMSATCOM Program Element (PE) started this process and will continue to deliver specific COMSATCOM capabilities as well as support COMSATCOM integration into the SATCOM Enterprise. Procurement of COMSATCOM capability is also supported by the Defense Working Capital Fund (DWCF). An Overarching SATCOM Enterprise Program of Record that incorporates COMSATCOM, MILSATCOM and International Partners into a hybrid structure is found under Program Element 1206431F, Project 657104, MILSATCOM Space Modernization Initiative (SMI).

Space acquisition must respond with speed and agility to emerging adversary threats. The Space Force is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, the Space Force will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This PE may include necessary civilian pay expenses required to manage, execute and deliver Commercial SATCOM in a single Enterprise architecture. The use of such funds would be in addition to the civilian pay expenses budgeted in PEs 1206392F and 1206398F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206445F / <i>Commercial SATCOM (COMSATCOM) Integration</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	49.500	0.000	0.000	0.000	0.000
Current President's Budget	47.869	5.000	0.000	0.000	0.000
Total Adjustments	-1.631	5.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.631	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 650140: *COMSATCOM*

Congressional Add: *Congressional Adds*

Congressional Add Subtotals for Project: 650140

Congressional Add Totals for all Projects

	<b>FY 2019</b>	<b>FY 2020</b>
	-	5.000
Congressional Add Subtotals for Project: 650140	-	5.000
Congressional Add Totals for all Projects	-	5.000

**C. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> COMSATCOM Financial and Customer Tools Development and Migration	14.511	0.000	0.000
<b>Description:</b> This activity will transition the existing COMSATCOM customer-facing tools and background financial management data systems from DISA services to the Space Force. These must be migrated to Space Force systems in order to continue the transition of responsibilities associated with the Space Force's sole procurement authority. A new system of tools is required to automate and securely distribute COMSATCOM acquisition and utilization of information to stakeholders, and to also reproduce and enhance the ordering, billing, activation, and provisioning, and other financial management tasks presently provided by DISA.			
<b>FY 2020 Plans:</b> N/A.			
<b>FY 2021 Plans:</b> N/A			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206445F / <i>Commercial SATCOM (COMSATCOM) Integration</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
N/A				
<p><b>Title:</b> Development of Transforming COMSATCOM Procurement Capabilities</p> <p><b>Description:</b> This project will consolidate lessons learned to develop a future COMSATCOM acquisition methodology that normalizes demonstrated savings potentials, closes operational gaps, and pursues increased end-user readiness, flexibility, and responsiveness. Specific to this task is research on legal and/or policy allowances that previously have not been exploited, as well as provisions that, if changed, further SATCOM acquisition transformation.</p> <p><b>FY 2020 Plans:</b> N/A.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>		5.804	0.000	0.000
<p><b>Title:</b> Enterprise Innovation Efforts</p> <p><b>Description:</b> This effort advances enterprise development in the four layers of a SATCOM capability, along with the over-arching governance structure necessary to enable ubiquitous service capability, awareness, control, and assessment. The effort will investigate Space Force's ability to influence commercial satellite systems, technologies, services, and architectures, with keen attention towards applicability across the SATCOM enterprise. Examples of focus areas include, but are not limited to: Enterprise Management &amp; Control; Bandwidth Pooling; Terminal Flexibility; and Managed Services.</p> <p><b>FY 2020 Plans:</b> N/A.</p> <p><b>FY 2021 Plans:</b> See PE 1206431F, Project 657104, MILSATCOM Space Modernization Initiative (SMI), Major Thrust Fighting SATCOM Enterprise.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>		27.554	0.000	0.000
<b>Accomplishments/Planned Programs Subtotals</b>		47.869	0.000	0.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206445F / <i>Commercial SATCOM (COMSATCOM) Integration</i>
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	FY 2019	FY 2020
<b>Congressional Add:</b> Congressional Adds  <b>FY 2020 Plans:</b> This effort will competitively acquire a limited proliferated Low Earth Orbit (LEO) capability in order to assess operational merit and feasibility. The rapid acquisition will include three (3) components: the delivery of a limited COMSATCOM service; a limited technical architecture to support the service; and a business model, inclusive of actual or prototype service request and billing software necessary for the Government to manage the capability amongst an autonomous, diverse and dynamic user community.	-	5.000
<b>Congressional Adds Subtotals</b>	-	5.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

The strategy/plan is to do multiple competitive awards.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206445F / <i>Commercial SATCOM</i> (COMSATCOM) Integration	<b>Project (Number/Name)</b> 650140 / COMSATCOM
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
COMSATCOM Financial and Customer Tools Development and Migration	TBD	TBD : TBD	-	14.511	Jul 2020	-		-		-		-	0.000	14.511	-
Development of Transforming COMSATCOM Procurement Capabilities	C/CPFF	E3 Federal Solutions, LLC : McLean, VA	-	5.804	Oct 2019	-		-		-		-	0.000	5.804	-
Enterprise Innovation Efforts	Various	Various : Somerville, SC	-	27.242	Jul 2019	-		-		-		-	0.000	27.242	-
Proliferated LEO	TBD	TBD : TBD	-	-		5.000	Mar 2020	-		-		-	0.000	5.000	-
<b>Subtotal</b>			-	47.557		5.000		-		-		-	0.000	52.557	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Other	Various	Various : Various	-	0.312	Jul 2019	-		-		-		-	0.000	0.312	-
<b>Subtotal</b>			-	0.312		-		-		-		-	0.000	0.312	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>		-	47.869	5.000	-	-	0.000	52.869	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206445F / <i>Commercial SATCOM</i> (COMSATCOM) <i>Integration</i>	<b>Project (Number/Name)</b> 650140 / <i>COMSATCOM</i>

FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b>COMSATCOM Tools</b>	
COMSATCOM Tools Contract Award	█
COMSATCOM Tools Contract Execution	██████████
<b>Transforming COMSATCOM Procurement</b>	
Transforming COMSATCOM Procurement Contract Award	█
Transforming COMSATCOM Procurement Contract Execution	██████████
<b>Enterprise Innovation Efforts</b>	
Enterprise Innovation Efforts projects identification/requirements	█
Enterprise Innovation Efforts projects vendor bid/awards	█
Enterprise Innovation Efforts projects execution	██████████
<b>Proliferated LEO</b>	
P-LEO Competition Awards	██████████

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206445F / <i>Commercial SATCOM</i> (COMSATCOM) <i>Integration</i>	<b>Project (Number/Name)</b> 650140 / <i>COMSATCOM</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>COMSATCOM Tools</b>				
COMSATCOM Tools Contract Award	2	2020	2	2020
COMSATCOM Tools Contract Execution	2	2020	4	2020
<b>Transforming COMSATCOM Procurement</b>				
Transforming COMSATCOM Procurement Contract Award	1	2020	1	2020
Transforming COMSATCOM Procurement Contract Execution	1	2020	4	2020
<b>Enterprise Innovation Efforts</b>				
Enterprise Innovation Efforts projects identification/requirements	4	2019	4	2019
Enterprise Innovation Efforts projects vendor bid/awards	4	2019	4	2019
Enterprise Innovation Efforts projects execution	4	2019	4	2020
<b>Proliferated LEO</b>				
P-LEO Competition Awards	2	2020	1	2021

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	1,251.558	428.525	432.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2,112.092
650006: <i>Next Generation Launch System Investment</i>	1,251.558	428.525	432.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2,112.092
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Program MDAP/MAIS Code:** 176

**Note**

- Prior year funding shown in Cost Table includes FY 2014 - FY 2017 that was executed in Program Element (PE) 0604853F.

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206853F, National Security Space Launch Program efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206853SF, National Security Space Launch Program from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

The National Security Space Launch (NSSL) program provides a space launch service that satisfies the government's National Launch Forecast (NLF) requirements to place National Security Space (NSS) space vehicles on orbit. NSSL is a launch service, not a weapon system, which is primarily funded with production funds.

This program, started late FY 2014, funds research and development activities and related studies, to include, but not limited to, items necessary to invest in new and/or upgraded launch systems and associated launch facilities to meet NSS launch needs leveraging domestic commercial launch providers. The RDT&E program will also fund continued research and development activities, mission manifest capability development & future studies for emerging NSS launch needs. These efforts will inform for future launch service development initiatives in order to continue sustained industry competition for Phase 3 starting in FY 2025 and future procurements.

The Air Force is investing in Launch Service Agreement (LSA) public-private partnerships for the development of new and/or upgraded domestic launch systems with commercial launch service providers. The anticipated result is two domestic, commercial launch service providers that will meet all current NSS launch requirements. In addition, the Air Force is continuing a technical maturation program to address the highest risks for rocket propulsion system (RPS) and LSA development. Development of the required RPSs have continued under the LSA public-private partnerships. Future development to capitalize on new technology and innovations developed by industry may continue to utilize public-private partnerships. The Air Force will also be leveraging opportunities to integrate Department of Defense payloads on to launch services procured commercially or by other Government agencies (i.e. NASA) where excess margin is available.

Space acquisition must respond with speed and agility to emerging adversary threats. Space and Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>
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authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or re-purpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver NSSL system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	443.035	432.009	561.163	0.000	561.163
Current President's Budget	428.525	432.009	0.000	0.000	0.000
Total Adjustments	-14.510	0.000	-561.163	0.000	-561.163
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-14.510	0.000			
• Other Adjustments	0.000	0.000	-561.163	0.000	-561.163

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 650006: *Next Generation Launch System Investment*  
 Congressional Add: *Launch Service Agreement Congressional Add*

	<b>FY 2019</b>	<b>FY 2020</b>
Congressional Add Subtotals for Project: 650006	200.000	-
Congressional Add Totals for all Projects	200.000	-

**C. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Rocket Propulsion System Development	0.000	37.500	0.000
<b>Description:</b> Invest in domestic rocket propulsion systems (RPS) under the Launch Service Agreement Other Transaction Authority (OTA) agreements. This investment enables the transition from the use of non-Allied space launch engines to domestic rocket propulsion systems. Continue to execute a single RPS OTA agreement utilizing a public-private partnership.			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>FY 2020 Plans:</b> Continue to execute public-private partnership for an industry upper stage engine common to multiple launch service providers, ensuring a domestic, cost-effective solution.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>				
<p><b>Title:</b> Launch Service Agreement</p> <p><b>Description:</b> Invest in providers of domestic Launch Services. This investment enables the transition from the use of non-Allied space launch engines to commercial launch services that also meet NSS needs. Execute Other Transaction Authority (OTA) agreements to develop various industry solutions utilizing public-private partnerships. Continued the technical maturation and risk reduction activities in support of Launch Service OTAs.</p> <p><b>FY 2020 Plans:</b> Continue investments with public-private partnerships with domestic launch providers for the development of new launch systems or upgrades to existing launch systems with the goal of two or more domestic, commercial launch providers that also meet NSS requirements. Includes RPS Investment and associated technical maturation and risk reduction activities. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc. LSA profile is based on the anticipated 4QTR 2019 award of Phase 2 that will result in the LSA efforts continuing with two service providers. Until the Phase 2 award the LSA funding cannot be broken out by provider due to the competitive nature of this acquisition strategy.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>		228.525	394.509	0.000
<b>Accomplishments/Planned Programs Subtotals</b>		228.525	432.009	0.000
		<b>FY 2019</b>	<b>FY 2020</b>	
<b>Congressional Add:</b> Launch Service Agreement Congressional Add		200.000	-	

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>
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	<b>FY 2019</b>	<b>FY 2020</b>
<b>FY 2019 Accomplishments:</b> Invested in public-private partnerships with domestic launch providers for the development of new launch systems or upgrades to existing launch systems with the goal of two or more domestic, commercial launch providers that also meet NSS requirements.		
<b>Congressional Adds Subtotals</b>	200.000	-

**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF 01 Line Item MSEELV: <i>Evolved Expendable Launch Veh (Space)</i>	787.646	1,237.635	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2,025.281
• SPAF 01 Line Item <i>MSEELC: Evolved Expendable Launch Capability</i>	615.081	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	615.081

**Remarks**

**E. Acquisition Strategy**

The Department intends to pursue a strategy to competitively invest in two or more domestic launch providers' development of new launch systems or upgrades to existing systems for future NSS launch services. This shared investment approach may also leverage commitments to a portion of the planned launch services (between FY 2020 and FY 2025) to decrease the required up front Government investment.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>	<b>Project (Number/Name)</b> 650006 / <i>Next Generation Launch System Investment</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Aerojet Rocketdyne OTA	C/Variou	Aerojet Rocketdyne : Canoga Park, CA	297.001	-		37.500	Nov 2019	-		-		-	0.000	334.501	-
United Launch Service RPS OTA	C/Variou	United Launch Service : Centennial, CO	128.630	-		-		-		-		-	0.000	128.630	-
United Launch Service LSA OTA	C/Variou	United Launch Service : Centennial, CO	109.000	160.231	Dec 2018	-		-		-		-	0.000	269.231	-
Orbital ATK OTA	C/Variou	Orbital ATK : Magna, UT	168.714	-		-		-		-		-	0.000	168.714	-
Northrop Grumman OTA	C/Variou	Northrop Grumman : Chandler, AZ	115.647	154.580	Dec 2018	-		-		-		-	0.000	270.227	-
Space X OTA	C/Variou	Space X : Hawthorne, CA	97.844	-		-		-		-		-	0.000	97.844	-
Blue Origin OTA	C/Variou	Blue Origin : Kent, WA	109.000	71.197	Dec 2018	-		-		-		-	0.000	180.197	-
AFRL Risk Reduction Study	C/Variou	Various : Various	0.000	7.074	Apr 2019	-		-		-		-	0.000	7.074	-
RAND Study	C/Variou	Various : Various	0.000	1.261	Apr 2019	-		-		-		-	0.000	1.261	-
Broad Agency Announcement Technical Maturation Studies	C/Variou	Various : Various	37.390	-		-		-		-		-	0.000	37.390	-
NASA Advance Booster Engine Demonstration Risk Reduction (ABEDRR)	SS/ Variou	Various : Various	40.374	-		-		-		-		-	0.000	40.374	-
Georgia Tech Combustion Stability Technical Maturation UARC	SS/ Variou	Various : Various	7.948	-		-		-		-		-	0.000	7.948	-
NASA Combustion Stability Technical Maturation Study	SS/ Variou	Various : Various	6.800	-		-		-		-		-	0.000	6.800	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>	<b>Project (Number/Name)</b> 650006 / <i>Next Generation Launch System Investment</i>
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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AFRL Combustion Stability Technical Maturation Study	SS/ Various	Various : Various	3.179	-		-		-		-		-	0.000	3.179	-
AFRL Hydrocarbon Boost Technical Maturation Demonstration	SS/ Various	Various : Various	37.154	-		-		-		-		-	0.000	37.154	-
FFRDC Mission Assurance	SS/CPAF	Aerospace : El Segundo, CA	27.899	11.424	Nov 2018	17.732	Nov 2019	-		-		-	0.000	57.055	-
Launch Enterprise System Engineering and Integration	C/FP	Various : Various	7.415	8.649	Mar 2019	12.040	Mar 2020	-		-		-	0.000	28.104	-
Launch Service Agreement (Including the Rocket Propulsion System)	C/TBD	TBD : TBD	0.000	-		352.784	Jan 2020	-		-		-	0.000	352.784	-
<b>Subtotal</b>			1,193.995	414.416		420.056		-		-		-	0.000	2,028.467	N/A

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	0.000	0.000	-
Organic Civilian Support	Reqn	DOD : El Segundo, CA	2.979	1.918	Oct 2018	1.960	Oct 2019	-		-		-	0.000	6.857	15.628
<b>Subtotal</b>			2.979	1.918		1.960		-		-		-	0.000	6.857	N/A

<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	SS/CPAF	Aerospace : El Segundo, CA	7.476	2.498	Nov 2018	0.955	Nov 2019	-		-		-	0.000	10.929	5.263



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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>	<b>Project (Number/Name)</b> 650006 / <i>Next Generation Launch System Investment</i>

	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<b><i>Rocket Propulsion System (RPS) Development</i></b>																												
Aerojet Rocketdyne OTA																												
<b><i>Launch Service Agreement (LSA)</i></b>																												
Blue Origin OTA																												
Northrop Grumman OTA																												
United Launch Services OTA																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 5	<b>R-1 Program Element (Number/Name)</b> PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>	<b>Project (Number/Name)</b> 650006 / <i>Next Generation Launch System Investment</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b><i>Rocket Propulsion System (RPS) Development</i></b>				
Aerojet Rocketdyne OTA	1	2019	4	2020
<b><i>Launch Service Agreement (LSA)</i></b>				
Blue Origin OTA	1	2019	4	2020
Northrop Grumman OTA	1	2019	4	2020
United Launch Services OTA	1	2019	4	2020

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>					<b>R-1 Program Element (Number/Name)</b> PE 0604256F / <i>Threat Simulator Development</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	33.666	59.693	57.725	0.000	57.725	44.777	36.511	31.655	32.237	Continuing	Continuing
662907: <i>Electronic Combat Intel Support</i>	-	2.556	2.603	2.643	0.000	2.643	2.700	2.748	2.796	2.848	Continuing	Continuing
663321: <i>Electronic Warfare Ground Test Resources</i>	-	23.869	49.714	47.593	0.000	47.593	34.429	25.980	20.937	21.321	Continuing	Continuing
667500: <i>Foreign Materiel Acquisition/Analysis</i>	-	7.241	7.376	7.489	0.000	7.489	7.648	7.783	7.922	8.068	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

The AF requires a comprehensive set of indoor and outdoor test facilities to implement the Air Force Electronic Warfare (EW) Test Process in order to test EW systems, including Directed Energy (DE). To manage program risk effectively throughout the EW weapons system acquisition process, and to conduct T&E effectively and efficiently, a broad multi-spectrum integrated set of T&E capabilities, ranging from Modeling and Simulation (M&S), to full-scale chamber testing, to flight testing on open-air ranges (OAR), is required. The EW Test Process Support task provides investment management and coordinated technical oversight of EW T&E facilities, including studies, analyses, and related documentation. Additionally, successful EW capabilities in battle are predicated upon a thorough understanding of the threat. To meet that requirement, this PE also includes funding to acquire foreign materiel, and to thoroughly test and evaluate that foreign materiel to understand how those threat systems affect and are affected by our EW systems.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	34.206	59.693	63.925	0.000	63.925
Current President's Budget	33.666	59.693	57.725	0.000	57.725
Total Adjustments	-0.540	0.000	-6.200	0.000	-6.200
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.540	0.000			
• Other Adjustments	0.000	0.000	-6.200	0.000	-6.200

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	PE 0604256F / <i>Threat Simulator Development</i>

**Change Summary Explanation**

FY21: The FY 2021 funding request was reduced by \$6.1 million to account for the availability of prior year execution balances.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0604256F / <i>Threat Simulator Development</i>				<b>Project (Number/Name)</b> 662907 / <i>Electronic Combat Intel Support</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
662907: <i>Electronic Combat Intel Support</i>	-	2.556	2.603	2.643	0.000	2.643	2.700	2.748	2.796	2.848	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This project provides funding to support Foreign Materiel Operational Test and Evaluation (FMOT&E), which ensures the ability of operational commands to test and develop effective Electronic Attack/Electronic Protection (EA/EP) techniques and tactics. Funds are required for: deployment of systems to test facilities; travel of personnel to the test sites to evaluate and validate test results; range and laboratory costs; test consumables; costs for instrumentation of systems; and contracted engineering support for the conduct of tests and subsequent reporting. Funding for this program is required to prevent future aircraft losses due to improper and inaccurate aircrew tactics (e.g., lack of evasive action or proper tactics training to avoid missile attack).

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> FMOT&E	2.556	2.603	2.643
<b>Description:</b> Supports Foreign Materiel Operational Test and Evaluation (FMOT&E)			
<b>FY 2020 Plans:</b> Continue operations of electronic combat intelligence support for fighter and bomber testing, mobility special operations transport and helicopter testing, classified operational assessments and extensive evaluations and reporting of system effectiveness.			
<b>FY 2021 Plans:</b> Continue operations of electronic combat intelligence support for fighter and bomber testing, mobility special operations transport and helicopter testing, classified operational assessments and extensive evaluations and reporting of system effectiveness.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Not applicable.			
<b>Accomplishments/Planned Programs Subtotals</b>	2.556	2.603	2.643

**C. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 06 PE 0604759F: <i>Major T&amp;E Investment</i>	213.273	106.663	208.680	-	208.680	207.845	152.044	159.017	155.705	Continuing	Continuing

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force									<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6				<b>R-1 Program Element (Number/Name)</b> PE 0604256F / <i>Threat Simulator Development</i>				<b>Project (Number/Name)</b> 662907 / <i>Electronic Combat Intel Support</i>			

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0605807F: <i>Test and Evaluation Support</i>	692.784	717.895	764.606	-	764.606	767.210	766.092	780.181	789.744	Continuing	Continuing
• RDTE 06 PE 0605976F: <i>Facility Restoration and Modernization - T&amp;E</i>	187.216	88.445	70.985	-	70.985	70.622	71.888	73.173	74.520	Continuing	Continuing
• RDTE 06 PE 0605978F: <i>Facility Sustainment - T&amp;E Support</i>	28.888	29.424	29.880	-	29.880	30.509	31.056	31.612	32.193	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

Not applicable.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0604256F / <i>Threat Simulator Development</i>				<b>Project (Number/Name)</b> 663321 / <i>Electronic Warfare Ground Test Resources</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
663321: <i>Electronic Warfare Ground Test Resources</i>	-	23.869	49.714	47.593	0.000	47.593	34.429	25.980	20.937	21.321	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The AF requires a comprehensive set of test facility modernizations to improve Electronic Warfare (EW) which includes Directed Energy (DE) weapons Test and Evaluation (T&E) capabilities. This funding is used to improve and modernize threat system simulators, stimulators, emitters and supporting infrastructure to sufficiently and cost effectively test and evaluate current and future weapon systems' ability to perform in realistic EW threat representative environments. The National Radar Cross Section (RCS) Test Facility (NRTF) at Holloman AFB, NM, provides timely, accurate, and secure RCS and antenna measurements for tri-service and joint program offices, DoD laboratories, Defense Advanced Research Projects Agency (DARPA) and industry. The NRTF tests fielded and developmental systems and technologies to meet Low Observable (LO) and EW customer requirements. The Guided Weapons Evaluation Facility (GWEF) at Eglin AFB, FL, and the Digital Integrated Air Defense System (DIADS) at Edwards AFB, CA, provide the ability to realistically evaluate hardware and software components of US weapon systems against manned hardware threat representations throughout the acquisition process. The GWEF provides simulations of advanced Infrared (IR) Surface-to-Air Missiles (SAMs) and Air-to-Air Missiles (AAMs), IR and Laser countermeasure functions, and the integration of actual threat hardware and ground clutter into advanced threat IR missile simulations. DIADS provides mission level simulations of both algorithm-based and man-in-the-loop-based enemy command and control (C2) capabilities that integrate early warning radar detection, SAM engagement capabilities, and limited ground-controlled fighter intercepts. The Benefield Anechoic Facility (BAF) at Edwards AFB, CA, and the Joint Preflight Integration of Munitions and Electronic Systems (J-PRIMES) facility at Eglin AFB, FL, both provide threat-representative EW emitters and stimulators to replicate a variety of land, sea and airborne threats in a controlled RF environment to evaluate full-scale weapon systems. The BAF additionally provides an ability to perform Electromagnetic Interference/Compatibility (EMI/EMC) testing to ensure radars, jammers, radios, and other flight-critical electronic systems will not interfere with each other during a mission. The Central Inertial and GPS Test Facility (CIGTF) at the 704th Test Group at Holloman AFB, NM provides threat-representative GPS jammers and laydowns in both lab and open-air environments to test avionics systems' performance when under various GPS-denial conditions. Provides EW test process support, conducting requirements analyses and other studies in support of AF T&E investments in test infrastructure and capabilities.

In previous R-2 Exhibits, EW T&E modernization efforts within this PE's BPAC were identified via two mission area categories: Improvement and Modernization (I&M) and EC Test Process Support. To more accurately align this R-2 Exhibit with the funding/execution baseline for this BPAC, the two aforementioned mission area categories have been combined into a single mission area titled, "Electronic Warfare Ground Test Resources".

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Electronic Warfare Ground Test Resources	23.869	49.714	47.593
<b>Description:</b> Provides for planning, monitoring, improvement and modernization of test capabilities to conduct and support the AF EW test process. Provides for EW test process support. Conducts requirements analyses and other studies in support of Air Force T&E investments in test infrastructure and capabilities. Plans for FY2020 and FY2021 include, but are not limited to,			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0604256F / <i>Threat Simulator Development</i>	<b>Project (Number/Name)</b> 663321 / <i>Electronic Warfare Ground Test Resources</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
the following EW efforts which may be accelerated or delayed due to variations in customer requirements and overall project execution.			
<b><i>FY 2020 Plans:</i></b> Continue executing development, procurement and integration of EW programs such as Red Integrated Air Defense System (Red-IADS), Electronics Warfare Test Capability Improvement Program (EWTCIP), Jammer Electronic Counter Measures (JECM) Enhancement and Integration, National RCS Test Facility (NRTF) Modernization and Measurement, Infra-Red Countermeasure-Capability Modernization (IRCM-CM), NEWEG for J-PRIMES (NEWEG-J Phase I) and CIGTF GPS NAVWAR Upgrade (CGNU). Continues 5GATE technology implementation projects. Also included is continued funding of SETA support necessary to implement planned Air Force test processes and infrastructure for EW capabilities, support tri-service monitoring and analysis teams established to identify emerging joint investment needs and requirements development, and assist in the management and monitoring of EW program elements and activities.			
<b><i>FY 2021 Plans:</i></b> Continue executing development, procurement and integration of EW programs such as Red Integrated Air Defense System (Red-IADS), Electronics Warfare Test Capability Improvement Program (EWTCIP), Jammer Electronic Counter Measures (JECM) Enhancement and Integration, National RCS Test Facility (NRTF) Modernization and Measurement, and Infra-Red Countermeasure-Capability Modernization (IRCM-CM). NEWEG for J-PRIMES (NEWEG-J Phase I), CIGTF GPS NAVWAR Upgrade (CGNU), and NRTF-Capability Modernization (CM) Programs are nearing the end of their development. This is also the final year for implementing 5GATE technologies. Also included is continued funding of SETA support necessary to implement planned Air Force test processes and infrastructure for I&M capabilities, support tri-service monitoring and analysis teams established to identify emerging joint investment needs and requirements development, and assist in the management and monitoring of I&M program elements and activities			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Overall decrease due to a reduction in FY21 funding to account for the availability of prior year execution balances.			
<b>Accomplishments/Planned Programs Subtotals</b>	23.869	49.714	47.593

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• RDTE 06 PE 0604759F: <i>Major T&amp;E Investment</i>	213.273	106.663	208.680	-	208.680	207.845	152.044	159.017	155.705	Continuing	Continuing
• RDTE 06 PE 0605807F: <i>Test and Evaluation Support</i>	692.784	717.895	764.606	-	764.606	767.210	766.092	780.181	789.744	Continuing	Continuing



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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0604256F / <i>Threat Simulator Development</i>	<b>Project (Number/Name)</b> 663321 / <i>Electronic Warfare Ground Test Resources</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0605976: <i>Facility Restoration &amp; Modernization - T&amp;E</i>	187.216	88.445	70.985	-	70.985	70.622	71.888	73.173	74.520	Continuing	Continuing
• RDTE 06 PE 0605978F: <i>Facilities Sustainment - T&amp;E Support</i>	28.888	29.424	29.880	-	29.880	30.509	31.056	31.612	32.193	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

NA

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0604256F / <i>Threat Simulator Development</i>				<b>Project (Number/Name)</b> 667500 / <i>Foreign Materiel Acquisition/ Analysis</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
667500: <i>Foreign Materiel Acquisition/Analysis</i>	-	7.241	7.376	7.489	0.000	7.489	7.648	7.783	7.922	8.068	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This project's specific purpose is to support USAF Foreign Materiel Program requirements through the acquisition and analysis of foreign materiel. Items considered for these Foreign Materiel Acquisition (FMA) funds are included in the prioritized Air Force FMA Top 20 list established each year. Each Major Command (MAJCOM) prepares and approves a Foreign Materiel - Mission Requirements Statement for each requirement. Annually, the MAJCOM commanders establish a list of their top 20 requirements. The MAJCOMs' requirements lists are integrated and prioritized into a classified Air Force requirement list. Each MAJCOM then approves the FMA Top 20 List and final validation comes from the Air Force Vice Chief of Staff. System analyses are based on and driven by acquisitions. The USAF provides assessments and data for threat systems to all DoD components.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> FMP	7.241	7.376	7.489
<b>Description:</b> Supports USAF Foreign Materiel Program (FMP) Requirements through the acquisition and analysis of foreign materiel.			
<b>FY 2020 Plans:</b> Continue to fund acquisition of available Foreign Materiel in accordance with the prioritized Air Force Foreign Materiel List; analysis of acquired Foreign Materiel; and operations and maintenance of the specialized Foreign Materiel assets.			
<b>FY 2021 Plans:</b> Continue to fund acquisition of available Foreign Materiel in accordance with the prioritized Air Force Foreign Materiel List; analysis of acquired Foreign Materiel; and operations and maintenance of the specialized Foreign Materiel assets.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Not applicable.			
<b>Accomplishments/Planned Programs Subtotals</b>	7.241	7.376	7.489

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0604256F / <i>Threat Simulator Development</i>	<b>Project (Number/Name)</b> 667500 / <i>Foreign Materiel Acquisition/ Analysis</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0604759F: <i>Major T&amp;E Investment</i>	213.273	106.663	208.680	-	208.680	207.845	152.044	159.017	155.705	Continuing	Continuing
• RDTE 06 PE 0605807F: <i>Test and Evaluation Support</i>	692.784	717.895	764.606	-	764.606	767.210	766.092	780.181	789.744	Continuing	Continuing
• RDTE 06 PE 0605976F: <i>Facility Restoration &amp; Modernization - T&amp;E</i>	187.216	88.445	70.985	-	70.985	70.622	71.888	73.173	74.520	Continuing	Continuing
• RDTE 06 PE 0605978F: <i>Facilities Sustainment -T&amp;E Support</i>	28.888	29.424	29.880	-	29.880	30.509	31.056	31.612	32.193	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

Not applicable.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604759F / <i>Major T&amp;E Investment</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	213.273	106.663	208.680	0.000	208.680	207.845	152.044	159.017	155.705	Continuing	Continuing
664597: <i>AF Test Investments</i>	-	213.273	106.663	208.680	0.000	208.680	207.845	152.044	159.017	155.705	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This PE provides planning, improvements, and modernization for test capabilities within Air Force Test Center (AFTC) Major Range and Test Facility Base organizations: 96 Test Wing at Eglin AFB FL, the 412 Test Wing at Edwards AFB CA, and Arnold Engineering Development Complex (AEDC) at Arnold AFB TN. The 704th Test Group at Holloman AFB NM and the McKinley Climatic Lab at Eglin AFB are aligned under AEDC as part of the management consolidation of Ground test capabilities. Finally, this PE also provides funds to Air Force Space Command (AFSPC) and the AFSPC Space Warfighting Combined Test Force (CTF) at Peterson AFB, CO to establish, maintain, and equip a Space Range capability for Test and Evaluation of space weapon systems.

The improvement and modernization (I&M) requirements are defined through the AF Test Investment Planning & Programming (TIPP) Process. All projects have been reviewed through the Tri-Service Reliance Process (to communicate AF efforts to the other services and avoid unwarranted duplication of effort) and are documented in the Technology Development Acquisition Program (TDAP) database. Each project has its own planning, development, equipment acquisition, equipment installation, and checkout phases which often require significant differences in funding from one year to the next. As such, the changes in category funding from year to year does not necessarily indicate program growth, but rather a planned phasing of I&M efforts. The test capabilities at these locations enable testing through all phases of weapon system acquisition, from system concept exploration through component and full-scale integrated weapon system test to operational test.

The 96 TW, at Eglin AFB FL, conducts and supports Developmental Test and Evaluation (DT&E) of non-nuclear air armaments; Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR) systems; target acquisition and weapon delivery systems; determines target/test item spectral signatures; and provides cyber testing capabilities as part of the Avionics Cyber Range (ACR).

The 412th Test Wing, at Edwards AFB CA, conducts and supports DT&E and Operational Test and Evaluation (OT&E) of aircraft and aircraft systems, aerospace research vehicles, unmanned aerial vehicles, cruise missiles, parachute delivery/recovery/systems, and cargo handling systems.

AEDC, at Arnold AFB TN, provides pre-flight reliability environmental test support for DoD aeropropulsion, flight systems, and space and missile programs. The center has 53 test facilities providing: aerodynamic testing of scale model aircraft, missiles, and space systems; testing of large and full-scale satellites, sensors, and space vehicles in a simulated space environment; altitude environmental testing for aircraft, missile, and spacecraft propulsion systems; testing of large-scale models such as space boosters together with their propulsion systems. This capability includes the world's largest climatic laboratory, the McKinley Climatic Laboratory at Eglin AFB, which provides controlled all-weather condition testing of full scale systems. The 704th TG at Holloman AFB, NM provides flight test and test support for joint, international and commercial customers in advanced avionics and weapons, inertial navigation systems, Global Positioning System (GPS) and other integrated aircraft and missile navigation systems. They test subsonic through hypersonic ground performance of aircraft and missiles in a flight-representative, highly instrumented

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604759F / <i>Major T&amp;E Investment</i>	
<p>environment while also coordinating and scheduling all US Air Force test operations at White Sands Missile Range. The 704th TG OL-AC at Wright-Patterson AFB, OH provides independent developmental T&amp;E in support of aircraft survivability and evaluation of full-scale aircraft landing gear, tires and brakes. They also provide an independent capability for component qualification.</p> <p>In order to align the strategic capability goals set forth in the 2018 National Defense Strategy and the mission of the AFTC, program element funding has been assigned to these six mission area categories: T&amp;E Range Asset Modernization, Hypersonics, Directed Energy, Cyberspace and Avionics Cyber, Autonomy, and Space Test Infrastructure.</p> <p>1) T&amp;E Range and Test Asset Modernization refers to those capabilities required to acquire the ability to test long range, high-speed, highly-instrumented, high-data rate weapons in a crowded and restricted spectrum, while operating at multiple classification and cybersecurity levels. Also included in this mission area is the ability to collect, analyze and store big data and the ability to do multi-domain testing across the enterprise with realistic threat scenarios at multiple classification level up to Special Access Program (SAP).</p> <p>2) Hypersonics refers to the ability to test and evaluate flight-representative hypersonic engines, materials, warheads and fuzes in all portions of the employment envelope and conduct flight testing both in simulation and open-air ranges with sufficient space, telemetry, photo-optics and Time Space Position Information (TSPI) to appropriately inform decision-makers fielding such systems.</p> <p>3) Directed Energy/Electronic Combat acquires the ability to characterize irradiance and beam properties on aircraft, small UAVs and ground targets and create realistic environments to simulate adversary air defense capabilities in the year 2030. Enables 5th-6th generation weapon testing/tactics development in a threat-realistic Anti-Access Area Denial (A2AD) environment using a combination of indoor and open-air ranges.</p> <p>4) Cyberspace and Avionics Cyber is the advancement of cybersecurity/resiliency test capability for network, C4ISR, and airborne weapon platforms and includes development of tools, techniques and hardware-in-the-loop capabilities focused on cybersecurity and cyber-resiliency.</p> <p>5) Autonomy refers to the ability to test autonomous aerial and ground systems with hundreds of independent vehicles. Must be able to monitor system-under-test locations and states with the ability for soft and hard termination. Must develop techniques and processes to test systems with artificial intelligence.</p> <p>6) Space Test Infrastructure refers to the development of a Space Combined Test Force and the development of technical capabilities, both terrestrial and space-based assets, in order to deploy an initial level of ability to test and evaluate the capability and resilience of DoD Space systems in a contested environment.</p> <p>This program is in Budget Activity 6, RDT&amp;E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.</p>		

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604759F / <i>Major T&amp;E Investment</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	216.844	181.663	164.005	0.000	164.005
Current President's Budget	213.273	106.663	208.680	0.000	208.680
Total Adjustments	-3.571	-75.000	44.675	0.000	44.675
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	36.000			
• Congressional Directed Transfers	0.000	-111.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.571	0.000			
• Other Adjustments	0.000	0.000	44.675	0.000	44.675

**Change Summary Explanation**

FY19: Approximate \$3.6 million decrease due to SBIR taxes.

FY20: \$75 million decrease: \$111 million representing the JSE Edwards (\$43 million), JSE Nellis (\$30 million), and the Eglin Cyberspace facility (\$38M) DoD Lab Pilot Program construction projects transferred from Major T&E Investment, PE 0604759F, to the MILCON appropriation for execution. \$36 million add for Space Threat Test Infrastructure.

FY21: Approximate \$45 million increase is a result of AF investment in space threat test infrastructure.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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<p><b>Title:</b> T&amp;E Range and Test Asset Modernization</p> <p><b>Description:</b> Description: T&amp;E Range and Test Asset Modernization refers to those capabilities required to acquire the ability to test long range, high-speed, highly-instrumented, high-data rate weapons in a crowded and restricted spectrum, while operating at multiple classification and cybersecurity levels. Ability to collect, analyze and store big data and ability to do multi-domain testing across the enterprise with realistic threat scenarios at multiple classification level up to Special Access Program (SAP).</p> <p><b>FY 2020 Plans:</b> Continue planning and/or executing of the following programs: CRIIS Production, Network Telemetry Integration Program (NTIP) (formerly iSIS), Common Airborne Network Instrumentation System (CANIS), Modular Mission Control Room Upgrade (MMCRU), Voice Communication System Upgrade (VCSU), Improved C2 Test Operations Center (I - C2TOC), Airborne Sensor Data Correlation Project (ASDC), Improved Data Link (IDL) Hardware-in-the-loop systems (HITLS) - Gen 4 &amp; 5, Next Generation Turbine Engine Test Capability (NGTETC), Improve Plant Reliability and Efficiency/Transonic Aero Test Capability (IMTPC), Improve Large Model Supersonic Aerodynamic Ground T&amp;E Capability (ILMSC) [formerly Tunnel 16S Reactivation], Advanced</p>	104.030	35.863	63.724
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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604759F / <i>Major T&amp;E Investment</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Engine Requirements for Power and Thermal Loads, High-speed Small Engine Test Capability (HSETC) (previously ASMEC-II), and the Gulf Range Enhancement (GRE) project.</p> <p><b>FY 2021 Plans:</b> Continue planning and/or executing of the following programs: CRIIS Production, Network Telemetry Integration Program (NTIP) (formerly iSIS), Common Airborne Network Instrumentation System (CANIS), Modular Mission Control Room Upgrade (MMCRU), Voice Communication System Upgrade (VCSU), Improved C2 Test Operations Center (I - C2TOC), Airborne Sensor Data Correlation Project (ASDC), Improved Data Link HITLS - Gen 4 &amp; 5, Multi-Level Security - Joint Collaborative Environment (MLS - JCE), Next Generation Turbine Engine Test Capability (NGTETC), Improve Plant Reliability and Efficiency/Transonic Aero Test Capability (IMTPC), Improve Large Model Supersonic Aerodynamic Ground T&amp;E Capability (ILMSC) [formerly Tunnel 16S Reactivation], Advanced Engine Requirements for Power and Thermal Loads, High-speed Small Engine Test Capability (HSETC) (previously ASMEC-II), High Pressure Air Additional Capacity (HPAAC), and the Gulf Range Enhancement (GRE) project.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase is associated with major equipment procurements planned for FY21 for NTIP, CANIS, MMCRU, VCSU, IMTPC, HPAAC and GRE.</p>				
<p><b>Title:</b> Hypersonics</p> <p><b>Description:</b> Hypersonics refers to the ability to T&amp;E flight-representative hypersonic engines, materials, warheads and fuzes in all portions of the employment envelope and conduct flight testing both in simulation and open-air ranges with sufficient space, telemetry, photo-optics and Time Space Position Information (TSPI) to appropriately inform decision-makers fielding such systems.</p> <p><b>FY 2020 Plans:</b> Planning and/or executing of the Imaging Improvement and Modernization Program (I2MP).</p> <p><b>FY 2021 Plans:</b> Continue planning and/or executing of the Imaging Improvement and Modernization Program (I2MP).</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Not applicable.</p>		25.400	1.000	1.338
<p><b>Title:</b> Directed Energy/Electronic Combat</p> <p><b>Description:</b> Directed Energy/Electronic Combat acquires the ability to characterize irradiance and beam properties on aircraft, small UAVs and ground targets and create realistic environments to simulate adversary air defense capabilities in the year 2030.</p>		3.850	33.400	89.033



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0604759F / <i>Major T&amp;E Investment</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Enables 5th-6th generation weapon testing/tactics development in a threat-realistic Anti-Access Area Denial (A2AD) environment using a combination of indoor and open-air ranges.  <b>FY 2020 Plans:</b> The current FY20 funding reflects a reduction due to the transfer of JSE Facility construction funding out of PE 0604759 to the MILCON appropriation. JSE equipment acquisition and simulation development continues.  <b>FY 2021 Plans:</b> Start of the Advanced Multispectral Development - Phase I (AMD-I) program and outfitting the JSE facilities.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase associated with procurement of technical equipment (i.e. domes, image generators, F-22/35 Simulator Hardware and Helmets) and start integration activities.				
<b>Title:</b> Cyberspace and Avionics Cyber  <b>Description:</b> Cyberspace and Avionics Cyber is the advancement of cybersecurity/resiliency test capability for network, C41SR and airborne weapon platforms and includes development of tools, techniques and hardware in the loop capabilities focused on cybersecurity and cyber-resiliency.  <b>FY 2020 Plans:</b> The current FY20 funding reflects a reduction due to transfer of Avionics Cyber Range (ACR) Facility construction funding out of PE 0604759 to MILCON appropriation. The Weapon System Cybersecurity (WSCS) Program tool program will continues execution.  <b>FY 2021 Plans:</b> FY21 funding will be used to equip the cyberspace facility as well continue the planning and execution of the Weapon System Cybersecurity (WSCS) Program tool development.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase associated with Cyber Test Tool and Threat Emulation Software procurement and integration.		21.381	0.200	9.410
<b>Title:</b> Autonomy  <b>Description:</b> Autonomy refers to the ability to test autonomous aerial and ground systems with hundreds of independent vehicles. Must be able to monitor system-under-test locations and states with the ability for soft and hard termination. Must develop techniques and processes to test systems with artificial intelligence.  <b>FY 2020 Plans:</b>		5.000	0.200	0.200

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604759F / <i>Major T&amp;E Investment</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
In FY20, there are no planned projects but limited funding is available should an opportunity arise.			
<b>FY 2021 Plans:</b> In FY21, there are no planned projects but limited funding is available should an opportunity arise.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Not applicable.			
<b>Title:</b> Space  <b>Description:</b> Space Test Infrastructure refers to the development of a Space Combined Test Force and the development of technical capabilities, both terrestrial and space-based assets, in order to deploy an initial level of ability to test and evaluate the capability and resilience of DoD Space systems in a contested environment.  <b>FY 2020 Plans:</b> Continues FY19 effort to establish foundational elements for the Combined Test Force to include test facilities, modeling and simulation development, establishment of range command and control capabilities, and investments in range sensors.  <b>FY 2021 Plans:</b> Provides funding required to establish full spectrum environment to evaluate space system survivability and lethality in a highly contested environment. Leverages initial FY19 investment of \$54 million and \$36 million FY20 congressional add.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 increase is a result of the AF FYDP space threat initiative.	53.612	36.000	44.975
<b>Accomplishments/Planned Programs Subtotals</b>	213.273	106.663	208.680

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0604256F: <i>Threat Simulator Development</i>	33.666	59.693	57.725	-	57.725	44.777	36.511	31.655	32.237	Continuing	Continuing
• RDTE 06 PE 0605807F: <i>Test and Evaluation Support</i>	692.784	717.895	764.606	-	764.606	767.210	766.092	780.181	789.744	Continuing	Continuing
• RDTE 06 PE 0605976F: <i>Facility Restoration &amp; Modernization - T&amp;E</i>	187.216	88.445	70.985	-	70.985	70.622	71.888	73.173	74.520	Continuing	Continuing
• RDTE 06 PE 0605978F: <i>Facility Sustainment - T&amp;E Support</i>	28.888	29.424	29.880	-	29.880	30.509	31.056	31.612	32.193	Continuing	Continuing

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604759F / <i>Major T&amp;E Investment</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
<b>Remarks</b>											

**E. Acquisition Strategy**

N/A

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605101F / <i>RAND Project Air Force</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	33.308	35.258	35.803	0.000	35.803	36.558	37.214	37.879	38.576	Continuing	Continuing
661110: <i>Project Air Force</i>	-	33.308	35.258	35.803	0.000	35.803	36.558	37.214	37.879	38.576	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This program provides for continuing analytical research across a broad spectrum of aerospace issues and concerns. The Project AIR FORCE (PAF) research agenda is focused primarily on mid to long-term problems; in addition, PAF provides quick response assistance for senior Air Force officials on high priority, near term issues. Within these areas, PAF addresses difficult and complex, far-reaching and inter-related questions linked to future strategies, approaches and policies, in order to enhance Air Force senior leadership's deliberations and decisionmaking on major issues. The Air Force Steering Group, chaired by the Vice Chief of Staff, reviews, monitors, and approves PAF annual research efforts. Each project is initiated, processed, and approved in accordance with PAF Sponsoring Agreement which requires General Officer (or SES equivalent) sponsorship and involvement on a continuing basis.

PAF is organized in four primary research program areas: strategy and doctrine; force modernization employment; manpower, personnel and training; and resource management. Integrative research projects are also conducted at the division level with direct support provided through the most applicable program. Research programs address organizational crosscutting issues as defined by specific research themes approved by the Air Force Steering Group. These research themes encompass a wide spectrum of topics including external challenges to national security; terrorism and homeland defense; joint and coalition operations; integrated roadmap for ISR capabilities; enhancing, tailoring and reducing infrastructure to meet new force requirements; potential changes to the Active/Reserve/National Guard/Civilian/Contractor manpower mix; and improved weapon system costing.

The research program will continue to build upon research foundations, examining the evolving security environment, emerging threats, national and military strategy, transformation approaches including investment strategies to provide capabilities within changing Defense budgets, operational concepts to meet evolving and increasingly joint missions, exploiting advanced technologies, increasing the effectiveness and efficiency of combat support, and developing the total force (Active/Reserve/National Guard/Civilian/Contractor). These efforts will continue to inform and support the senior Air Force leadership regarding personnel management and training; improving logistical efficiencies and force sustainment; ongoing conflicts and joint operations; force structure capabilities, limitations, and operational concepts; and making force structure tradeoffs within resource constraints to meet future national security and Air Force needs.

Future research will build upon earlier work to continue to help the Air Force to rapidly and appropriately adapt to the changing world environment and emerging threats; continue to modernize and employ its force structure to provide capabilities within changing DoD budgets; assess lessons learned from recent and ongoing conflicts; develop and utilize its total force; and enhance the support of our aerospace forces, ranging from sustainment of the force structure to agile combat support.

PAF research spans functional and organizational boundaries and is managed in a manner to facilitate independence and freedom from organizational bias thereby providing perspectives and insights to senior Air Force leaders free from parochial influences not necessarily in the best interest of the Air Force at large. Benefits of

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605101F / <i>RAND Project Air Force</i>
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independent non-Department of Defense analysis of complex present day and emerging issues are shared beyond the immediacy of the Air Force. PAF study results are given wide dissemination within the DOD on a routine basis and are deposited with the Defense Technical Information Center available to a broad range of qualified government and commercial-sector individuals and activities.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	34.614	35.258	35.869	0.000	35.869
Current President's Budget	33.308	35.258	35.803	0.000	35.803
Total Adjustments	-1.306	0.000	-0.066	0.000	-0.066
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.306	0.000			
• Other Adjustments	0.000	0.000	-0.066	0.000	-0.066

**Change Summary Explanation**

Increase due to the increased Scientific Technical Equivalent Rate.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Strategy & Doctrine	8.200	8.300	8.480
<b>Description:</b> Provides for continuing analytical research across a broad spectrum of aerospace issues and concerns--strategy and doctrine.			
<b>FY 2020 Plans:</b> Conducting analytical research across a broad spectrum of aerospace issues and concerns--integrative research/direct support.			
<b>FY 2021 Plans:</b> Will conduct continuing analytical research across a broad spectrum of aerospace issues and concerns--integrative research/direct support			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0605101F / <i>RAND Project Air Force</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Increase due to increased analysis requirements				
<p><b>Title:</b> Force Development</p> <p><b>Description:</b> Provides analytical research across a broad spectrum of aerospace issues and concerns--force development employment.</p> <p><b>FY 2020 Plans:</b> Provide for continuing analytical research across a broad spectrum of aerospace issues and concerns--force development employment.</p> <p><b>FY 2021 Plans:</b> Will conduct continuing analytical research across a broad spectrum of aerospace issues and concerns--force development employment.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase due to increased analysis requirements</p>		8.202	8.340	8.426
<p><b>Title:</b> Manpower, Personnel &amp; Training</p> <p><b>Description:</b> Provides analytical research across a broad spectrum of aerospace issues and concerns--manpower, personnel and training.</p> <p><b>FY 2020 Plans:</b> Conduct continuing analytical research across a broad spectrum of aerospace issues and concerns--manpower, personnel and training.</p> <p><b>FY 2021 Plans:</b> Will conduct continuing analytical research across a broad spectrum of aerospace issues and concerns--manpower, personnel and training.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase due to increased analysis requirements</p>		7.202	8.340	8.480
<p><b>Title:</b> Resource Management</p> <p><b>Description:</b> Provides analytical research across a broad spectrum of aerospace issues and concerns--resource management.</p> <p><b>FY 2020 Plans:</b></p>		8.202	8.340	8.480

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0605101F / <i>RAND Project Air Force</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Conduct continuing analytical research across a broad spectrum of aerospace issues and concerns--manpower, personnel and training.</p> <p><b>FY 2021 Plans:</b> Will conduct continuing analytical research across a broad spectrum of aerospace issues and concerns--manpower, personnel and training.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase due to increased analysis requirements</p>				
<p><b>Title:</b> Integrative Research/Direct Support</p> <p><b>Description:</b> Provides for continuing analytical research across a broad spectrum of aerospace issues and concerns--integrative research/direct support.</p> <p><b>FY 2020 Plans:</b> Conduct continuing analytical research across a broad spectrum of aerospace issues and concerns--integrative research/direct support.</p> <p><b>FY 2021 Plans:</b> Will conduct continuing analytical research across a broad spectrum of aerospace issues and concerns--integrative research/direct support</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase due to increased analysis requirements</p>		1.502	1.938	1.937
<b>Accomplishments/Planned Programs Subtotals</b>		33.308	35.258	35.803
<b>D. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>E. Acquisition Strategy</b>				
N/A				



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605502F / <i>Small Business Innovation Research</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	795.378	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
663005: <i>Small Business Innovation Research</i>	-	795.378	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Implementation of 15 U.S.C., Section 638 to maximize the creative, innovative, and entrepreneurial spirit of small businesses to solve technological problems.

The budget for this program is implemented after an appropriation is passed as directed in provisions of 15 U.S.C., Section 638.

This program element may include necessary civilian pay expenses required to manage, execute and deliver Small Business Innovation Research and Small Business Technology Transfer activities.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	795.378	0.000	0.000	0.000	0.000
Total Adjustments	795.378	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	795.378	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<b>Title:</b> Small Business Innovation Research & Small Business Technology Transfer	795.378	0.000	0.000	0.000	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605502F / <i>Small Business Innovation Research</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><b>Description:</b> Implements 15 U.S.C., Section 638 for Air Force Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) efforts, including associated program management and civilian manpower costs to run the Air Force SBIR and STTR programs.</p> <p><b>FY 2020 Plans:</b> The budget for this program is implemented after an appropriation is passed as directed in provisions of 15 U.S.C., Section 638.</p> <p><b>FY 2021 Base Plans:</b> Not Applicable</p> <p><b>FY 2021 OCO Plans:</b> Not Applicable</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Not Applicable</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	795.378	0.000	0.000	0.000	0.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

N/A

**UNCLASSIFIED**

**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605712F / <i>Initial Operational Test &amp; Evaluation</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	17.383	13.793	13.557	0.000	13.557	14.233	14.487	14.417	14.682	Continuing	Continuing
660191: <i>Initial Operational Test and Eval</i>	-	17.383	13.793	13.557	0.000	13.557	14.233	14.487	14.417	14.682	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This program element funds Congressionally mandated Initial Operational Test and Evaluation (IOT&E) to support major weapon system acquisition decisions beyond Low-Rate Initial Production (LRIP), Milestone C, full rate production, fielding, and declaration of Initial Operational Capability (IOC). For Major Defense Acquisition Programs (MDAP), the law requires IOT&E be completed under realistic operating conditions before proceeding beyond LRIP. IOT&E will be planned to answer all critical operational issues (COI) as thoroughly as possible. IOT&E is conducted to determine the operational effectiveness and suitability and resolve overall mission capability of systems undergoing research and development (R&D) efforts. It is an evaluation of a system's performance when the complete system is tested and evaluated against operational criteria by personnel with the same qualifications as those who will operate, maintain and support the system when deployed. In general, IOT&E is performed on new systems in development, major modifications, and other systems as directed. This PE funds the Air Force Operational Test Agency's participation in Integrated Test and Evaluation (IT&E), Multiservice Operational Test and Evaluation (MOT&E), and Follow-on Operational Test and Evaluation (FOT&E) when it is the continuation of IOT&E activities past the full rate production decision. FOT&E answers specific questions about unresolved COIs and test issues or completes areas not finished during the IOT&E. This PE also funds related operational test and evaluation (OT&E) activities such as Early Influence, Operational Utility Evaluations (OUE), Early Operational Assessments (EOA), and Operational Assessments (OA) which are independent OT&Es supporting major milestones and decision points prior to Milestone C, full rate production, fielding, or declaration of IOC. IOT&E programs are identified in several system categories: Air; Space; Weapons; Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR); and Combat Support. This program element is driven by Congressional and DoD acquisition mandated requirements for operational testing. AFOTEC schedules and executes tests according to the forecasted test readiness of the MDAP program offices.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605712F / <i>Initial Operational Test &amp; Evaluation</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	18.043	13.793	16.497	0.000	16.497
Current President's Budget	17.383	13.793	13.557	0.000	13.557
Total Adjustments	-0.660	0.000	-2.940	0.000	-2.940
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.660	0.000			
• Other Adjustments	0.000	0.000	-2.940	0.000	-2.940

**Change Summary Explanation**

FY21: \$2.5 million decrease is a correction for a FY20 adjustment associated with the Weapon System Evaluation Program (WSEP) incorrectly added to PE 65712.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Air Systems OT&E  <b>Description:</b> Plan, execute and report OT&E for Air Systems  <b>FY 2020 Plans:</b> -Airborne Warning and Control System (AWACS) Block 40/45: Plan for FOT&E -B-52 Commercial Engine Replacement Program (B-52 CERP): Conduct early influence -B-52 Radar Modernization Program (B-52 RMP): Conduct early influence -Combat Rescue Helicopter (CRH): Plan for IOT&E -F-15 Eagle Passive and Active Warning and Survivability System (F-15 EPAWSS): Conduct OA -Global Hawk Ground Segment Modernization Program GH GSMP): Conduct OA -KC-46A: Complete IOT&E -MH-139: Conduct OA -RQ-4B Global Hawk Block 30 Multi-Spectral Intelligence (MSI): Plan for IOT&E -T-7A (formerly Advanced Pilot Training (APT T-X)): Conduct early influence -VC-25B (formerly PAR): Plan for OA -Conduct other planning and operational testing for new air system programs as the requirement becomes known to AFOTEC  <b>FY 2021 Plans:</b>	2.397	1.392	5.411

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0605712F / <i>Initial Operational Test &amp; Evaluation</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>-Airborne Warning and Control System (AWACS) Block 40/45: Conduct FOT&amp;E</li> <li>-B-52 Commercial Engine Replacement Program (B-52 CERP): Conduct early influence</li> <li>-B-52 Radar Modernization Program (B-52 RMP): Plan for OA</li> <li>-Combat Rescue Helicopter (CRH): Conduct IOT&amp;E</li> <li>-F-15 Eagle Passive and Active Warning and Survivability System (F-15 EPAWSS): Plan for IOT&amp;E</li> <li>-Global Hawk Ground Segment Modernization Program GH GSMP): Conduct IOT&amp;E</li> <li>-MH-139: Conduct IOT&amp;E</li> <li>-RQ-4B Global Hawk Block 30 Multi-Spectral Intelligence (MSI): Conduct IOT&amp;E</li> <li>-T-7A (formerly Advanced Pilot Training (APT T-X)): Plan for OA</li> <li>-VC-25B (formerly PAR): Conduct OA</li> <li>-Conduct other planning and operational testing for new air system programs as the requirement becomes known to AFOTEC</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Test requirements increase in FY2021.</p>				
<p><b>Title:</b> Space Systems OT&amp;E</p> <p><b>Description:</b> Plan, execute and report OT&amp;E for Space Systems</p> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>-Advanced Extremely High Frequency Satellite Communications (Advanced EHF): Conduct early influence</li> <li>-Evolved Strategic SATCOM (ESS): Conduct early influence</li> <li>-Global Positioning System Block III (GPS III): Conduct OUE</li> <li>-Military GPS User Equipment (GPS MGUE): Conduct OUE</li> <li>-Global Positioning System III Contingency Operations (GPS III COps): Conduct OUE</li> <li>-Global Positioning System Military-Code Early Use (GPS MCEU): Conduct OUE</li> <li>-GPS Next Generation Control Segment (GPS OCX): Conduct early influence</li> <li>-Integrated Strategic Planning and Analysis Network Increment 5 (ISPAN Inc 5): Conduct agile release tests</li> <li>-Long-Range Discrimination Radar (LRDR): Plan for IOT&amp;E</li> <li>-Next-Generation Overhead Persistent Infrared (Next-Gen OPIR): Conduct OA</li> <li>-Protected Tactical Enterprise Service (PTES): Conduct MOT&amp;E</li> <li>-Protected Tactical SATCOM (PTS): Conduct early influence</li> <li>-Space Based Infrared System (SBIRS): Conduct early influence</li> <li>-Space C2 (formerly JMS): Conduct IOT&amp;E</li> <li>-Weather System Follow-On Microwave (WSF-M): Plan for OA</li> </ul>		1.296	2.737	1.932

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0605712F / <i>Initial Operational Test &amp; Evaluation</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>-Conduct other planning and operational testing for new space system programs as the requirement becomes known to AFOTEC</p> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>-Advanced Extremely High Frequency Satellite Communications (Advanced EHF): Conduct early influence</li> <li>-Evolved Strategic SATCOM (ESS): Conduct early influence</li> <li>-Military GPS User Equipment (GPS MGUE): Conduct OUE 2</li> <li>-GPS Next Generation Control Segment (GPS OCX): Plan for MOT&amp;E</li> <li>-Integrated Strategic Planning and Analysis Network Increment 5 (ISPAN Inc 5): Conduct agile release tests</li> <li>-Long-Range Discrimination Radar (LRDR): Conduct IOT&amp;E</li> <li>-Next-Generation Overhead Persistent Infrared (Next-Gen OPIR): Conduct OA</li> <li>-Protected Tactical Enterprise Service (PTES): Complete MOT&amp;E</li> <li>-Protected Tactical SATCOM (PTS): Plan for EOA</li> <li>-Space Based Infrared System (SBIRS): Conduct early influence</li> <li>-Space C2 (formerly JMS): Complete IOT&amp;E</li> <li>-Weather System Follow-On Microwave (WSF-M): Conduct OA</li> <li>-Conduct other planning and operational testing for new space system programs as the requirement becomes known to AFOTEC</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Test requirements decrease in FY2021.</p>				
<p><b>Title:</b> Weapons Systems OT&amp;E</p> <p><b>Description:</b> Plan, execute and report OT&amp;E for Weapons Systems</p> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>-AIM 120D System Improvement Program 3 (AIM-120D SIP-3): Conduct MOT&amp;E</li> <li>-AIM-9X Block II 9.4xx (AIM-9X Blk II 9.4xx): Conduct FOT&amp;E</li> <li>-Air Launched Rapid Response Weapon (ARRW): Conduct early influence</li> <li>-Hypersonic Conventional Strike Weapon (HCSW): Conduct early influence</li> <li>-Inter-Continental Ballistic Missile Fuze (ICBM FUZE): Plan for OA</li> <li>-Small Diameter Bomb II (SDB II): Complete MOT&amp;E</li> <li>-Conduct other planning and operational testing for new weapons system programs as the requirement becomes known to AFOTEC</li> </ul> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>-AIM 120D System Improvement Program 3 (AIM-120D SIP-3): Complete MOT&amp;E</li> <li>-Air Launched Rapid Response Weapon (ARRW): Conduct early influence</li> </ul>		4.169	2.772	1.460

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0605712F / <i>Initial Operational Test &amp; Evaluation</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<ul style="list-style-type: none"> <li>-Hypersonic Conventional Strike Weapon (HCSW): Conduct early influence</li> <li>-Inter-Continental Ballistic Missile Fuze (ICBM FUZE): Conduct OA</li> <li>-Small Diameter Bomb II (SDB II): Conduct MOT&amp;E 2</li> <li>-Conduct other planning and operational testing for new weapons system programs as the requirement becomes known to AFOTEC</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Test requirements decrease in FY2021.</p>				
<p><b>Title:</b> C4ISR Systems OT&amp;E</p> <p><b>Description:</b> Plan, execute and report OT&amp;E for C4ISR Systems</p> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>-Air Force Integrated Personnel and Pay System (AFIPPS): Plan for IOT&amp;E 1</li> <li>-AN/TPS-81 (Three Dimensional Expeditionary Long Range Radar (3DELRR)): Conduct early involvement</li> <li>-Air Operations Center Weapon System Modification Program (AOC WS Mod): Conduct OUE 1</li> <li>-Distributed Common Ground System (DCGS): Conduct OUEs 20-1, 20-2, 20-3, 20-4</li> <li>-Family of Advanced Beyond Line Of Sight Terminals (FAB T): Conduct IOT&amp;E</li> <li>-Nuclear Planning and Execution System Recapitalization (NPES): Conduct Release tests</li> <li>-Presidential and National Voice Conferencing (PNVC): Conduct early involvement</li> <li>-RQ-4 Global Hawk Block 30/Airborne Signals Intelligence Payload (ASIP): Conduct FOT&amp;E 1</li> <li>-Unified Platform (UP): Conduct Release tests</li> <li>-Wide Area Surveillance (WAS): Conduct IOT&amp;E</li> <li>-Conduct other planning and operational testing for new C4ISR programs as the requirement becomes known to AFOTEC</li> </ul> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>-Air Force Integrated Personnel and Pay System (AFIPPS): Conduct IOT&amp;E 1</li> <li>-AN/TPS-81 (Three Dimensional Expeditionary Long Range Radar (3DELRR)): Plan for OA</li> <li>-Air Operations Center Weapon System Modification Program (AOC WS Mod): Plan for OUE 2</li> <li>-Distributed Common Ground System (DCGS): Conduct OUEs 21-1, 22-2, 22-3, 22-4</li> <li>-Family of Advanced Beyond Line Of Sight Terminals (FAB T): Plan for FOT&amp;E</li> <li>-Nuclear Planning and Execution System Recapitalization (NPES): Conduct Release tests</li> <li>-Presidential and National Voice Conferencing (PNVC): Plan for MOT&amp;E</li> <li>-RQ-4 Global Hawk Block 30/Airborne Signals Intelligence Payload (ASIP): Conduct FOT&amp;E 2</li> <li>-Unified Platform (UP): Conduct Release tests</li> </ul>		4.432	6.497	4.081

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0605712F / <i>Initial Operational Test &amp; Evaluation</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>-Wide Area Surveillance (WAS): Conduct FOT&amp;E</p> <p>-Conduct other planning and operational testing for new C4ISR programs as the requirement becomes known to AFOTEC</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Test requirements decrease in FY2021.</p>				
<p><b>Title:</b> Combat Support OT&amp;E</p> <p><b>Description:</b> Plan, execute and report OT&amp;E for Combat Support OT&amp;E</p> <p><b>FY 2020 Plans:</b></p> <ul style="list-style-type: none"> <li>-Common Munitions Built-In Test Reprogramming Equipment Service Life Extension Program (CMBRE SLEP): Conduct early involvement</li> <li>-Deliberate and Crisis Action Planning and Execution Segments Increment 2B (DCAPES Inc 2B): Conduct OUE 1, 2</li> <li>-Military GPS User Equipment Inc 2 Handheld (MGUE Inc 2 HH): Conduct early involvement</li> <li>-Maintenance, Repair, and Overhaul Initiative (MROI): Plan for IOT&amp;E</li> <li>-Conduct other planning and operational testing for new combat support programs as the requirement becomes known to AFOTEC</li> </ul> <p><b>FY 2021 Plans:</b></p> <ul style="list-style-type: none"> <li>-Common Munitions Built-In Test Reprogramming Equipment Service Life Extension Program (CMBRE SLEP): Plan for OUE</li> <li>-Deliberate and Crisis Action Planning and Execution Segments Increment 2B (DCAPES Inc 2B): Conduct OUE 3, 4</li> <li>-Military GPS User Equipment Inc 2 Handheld (MGUE Inc 2 HH): Conduct early involvement</li> <li>-Maintenance, Repair, and Overhaul Initiative (MROI): Conduct IOT&amp;E</li> <li>-Conduct other planning and operational testing for new combat support programs as the requirement becomes known to AFOTEC</li> </ul> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Not applicable.</p>		0.126	0.395	0.673
<p><b>Title:</b> NDAA 1647 Cyber Testing</p> <p><b>Description:</b> Plan and execute Congressional, DoD and Air Force mandated cyber security testing on AFOTEC programs for NDAA 1647 effort.</p> <p><b>FY 2020 Plans:</b> None</p> <p><b>FY 2021 Plans:</b></p>		4.963	0.000	0.000



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605712F / <i>Initial Operational Test &amp; Evaluation</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
None			
<b>Accomplishments/Planned Programs Subtotals</b>	17.383	13.793	13.557

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

N/A

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605807F / <i>Test and Evaluation Support</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	692.784	717.895	764.606	0.000	764.606	767.210	766.092	780.181	789.744	Continuing	Continuing
6606TG: <i>704th Test Group</i>	-	37.558	37.948	39.914	0.000	39.914	45.516	44.258	41.591	42.420	Continuing	Continuing
6606TS: <i>Test and Evaluation Support</i>	-	655.226	679.947	724.692	0.000	724.692	721.694	721.834	738.590	747.324	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

This program element provides resources to operate the Air Force Test Center (AFTC) test activities which are included in the Department of Defense (DoD) Major Range and Test Facility Base (MRTFB). Test facilities/capabilities include wind tunnels, rocket and jet engine test cells, hypersonic and subsonic testing, modeling and simulation, technology, limited space environmental simulation chambers, armament test ranges, hardware-in-the-loop test facilities, climatic test facilities, avionics test facilities, aircraft testbeds, dry lake bed landing sites, instrumented test ranges, and test aircraft maintenance, as well as USAF Test Pilot School.

Test and Evaluation (T&E) Support funds institutional test infrastructure activities including: Command and supervisory staffs; supply stocks; maintenance, repair, and replacement of worn or obsolete test equipment and facilities; test infrastructure for data collection, transmission, reduction, and analysis; civilian salaries; temporary duty travel; range operations and material support contract costs for hardware and software engineering and maintenance; and minor improvement and modernization projects. It also funds institutional test aircraft depot level maintenance such as: Programmed Depot Maintenance (PDM), the calendar-based cyclic scheduling of aircraft into depots for update/inspection; modifications and any other depot level repairs required by the aircraft System Program Directors (SPD); engine overhauls; depot-provided area assistance; and assorted ground support equipment overhauls.

Within AFTC there are three test wings. The first is Arnold Engineering and Development Complex (AEDC), located at Arnold Air Force Base (AFB), TN. The AEDC institutional test infrastructure supports operations of the largest complex of ground test facilities in the world (including transonic, supersonic, and hypersonic wind tunnels; rocket motor and turbine engine test cells; space environmental test chambers, hyper ballistic ranges; and other specialized facilities). AEDC also supports geographically separated facilities which include the National Full-Scale Aerodynamic Complex (NFAC) located at NASA's AMES Research Center, California, Tunnel 9 located at White Oak, Maryland, and the McKinley Climatic Lab located on Eglin AFB, Florida. The 412 Test Wing (TW) is located at Edwards AFB, CA. Its institutional test infrastructure supports weapons system development and operational test and evaluation for aircraft, aircraft subsystems and aircraft weapon systems, aerospace research vehicles, unmanned miniature vehicles, cruise missiles, parachute delivery/recovery systems, cargo handling systems, communications, information operations, and Electronic Warfare (EW) systems for DoD and allied forces. The 412TW mission also includes the USAF Test Pilot School. Lastly, the 96 TW, located at Eglin AFB, FL, is a joint test and training complex comprised of 724 square miles of land area, and approximately 123,000 square miles of water area. The 96TW provides the institutional test infrastructure required to conduct developmental and operational test and evaluation of non-nuclear air armaments (including aircraft guns, ammunition, and air-to-surface and air-to-air guided munitions); Command, Control, Communications, Computers and Intelligence/Surveillance/Reconnaissance (C4ISR) systems; target acquisition and weapon delivery systems; and special operations aircraft systems. 96TW provides a scientific test process that supports the development, production, sustainment, and enhancement of munitions systems that support tri-service digital weapons development. T&E support services contracts are awarded on the basis of full and open competition.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605807F / <i>Test and Evaluation Support</i>
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This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	692.784	717.895	721.615	0.000	721.615
Current President's Budget	692.784	717.895	764.606	0.000	764.606
Total Adjustments	0.000	0.000	42.991	0.000	42.991
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	42.991	0.000	42.991

**Change Summary Explanation**

FY21: The \$43 million increase is a result of \$19 million in favorable adjustments to civilian pay to include funding B-21 manpower, alignment of civ pay authorizations with actual funding, reversing previous civ pay assumptions, and the civ pay reprice adjustment. In addition, there was a \$9 million civ pay increase for the civ pay raise and FY21 performance awards. Finally, there was an increase of \$15 million for natural disaster relief recovery efforts associated with Hurricane Michael.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0605807F / <i>Test and Evaluation Support</i>				<b>Project (Number/Name)</b> 6606TG / <i>704th Test Group</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
6606TG: <i>704th Test Group</i>	-	37.558	37.948	39.914	0.000	39.914	45.516	44.258	41.591	42.420	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Project infrastructure support is provided for the unique capabilities of the 704th Test Group (TG) facilities: Central Inertial and Global Positioning System (GPS) Test Facility (CIGTF/746th Test Squadron), the Holloman High Speed Test Track (HHSTT/846th Test Squadron) and the National Radar Cross Section (RCS) Test Facility (NRTF/704 TG Det 2), the 586th Flight Test Squadron including Detachment 1 (Det 1), 704 TG Operating Location (704 TG OL-AA) at Kirtland AFB, and 704 TG Operation Location (704 TG OL-AC) at Wright-Patterson AFB.

CIGTF provides independent test and evaluation of inertial, Global Positioning System, and integrated systems used for aircraft navigation and missile guidance systems, including vulnerability to electronic interference.

HHSTT capabilities include full-scale testing in flight representative environments, realistic live-fire simulations, test item and target fragment recovery, precision trajectory analysis and high speed photography.

NRTF provides radar cross section (RCS) monostatic and bistatic amplitude and phase measurements, antenna pattern measurements, glint and near field measurements for low observable targets.

The 586th Flight Test Squadron executes flight test and test support for advanced avionics and weapons development of joint, international and commercial test programs. Det 1 provides the liaison function for coordinating and scheduling all US Air Force test and training operations at White Sands Missile Range (WSMR). OL-AA provides test support for the Air Force Research Lab (AFRL) Directed Energy Division.

The 704 TG OL-AC includes the Landing Gear Test Facility (LGTF) with capabilities such as variable and fixed inertia dynamometers, compression/tension load applicators, 4 drop towers, a burst pit and a dynamic load simulator. The 704 TG OL-AC also includes the Air Vehicle Survivability Office that provides support for Air Force aircraft acquisition programs. The 704th TG support services contracts are awarded on the basis of full and open competition.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> 704th Test Group	37.558	37.948	39.914
<b>Description:</b> Provide infrastructure at the 704th Test Group (TG) to support testing of DoD, other Government Agencies, foreign military sales, and commercial weapon systems.			
<b>FY 2020 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0605807F / <i>Test and Evaluation Support</i>	<b>Project (Number/Name)</b> 6606TG / <i>704th Test Group</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
Total consists of utilities, contractor services, and civilian pay.			
<b><i>FY 2021 Plans:</i></b> Total consists of utilities, contractor services, and civilian pay.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> \$2 million increase is a result of the FY21 civ pay raise and performance award as well as the civ pay reprice and reversal of the FY20 civ pay assumptions.			
<b>Accomplishments/Planned Programs Subtotals</b>	37.558	37.948	39.914

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Not applicable

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0605807F / <i>Test and Evaluation Support</i>				<b>Project (Number/Name)</b> 6606TS / <i>Test and Evaluation Support</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
6606TS: <i>Test and Evaluation Support</i>	-	655.226	679.947	724.692	0.000	724.692	721.694	721.834	738.590	747.324	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This project provides resources to operate the Air Force Test Center (AFTC) test activities which are included in the Department of Defense (DoD) Major Range and Test Facility Base (MRTFB). Test facilities/capabilities operated through this program include wind tunnels, rocket and jet engine test cells, hypersonic and subsonic testing, modeling and simulation, technology, limited space environmental simulation chambers, armament test ranges, hardware-in-the-loop test facilities, climatic test facilities, avionics test facilities, aircraft testbeds, dry lakebed landing sites, instrumented test ranges, and test aircraft maintenance, as well as USAF Test Pilot School.

Test and Evaluation (T&E) Support funds institutional test infrastructure activities including: Command and supervisory staffs; supply stocks; maintenance, repair, and replacement of worn or obsolete test equipment and facilities; test infrastructure for data collection, transmission, reduction, and analysis; civilian salaries; temporary duty travel; range operations and material support contract costs for hardware and software engineering and maintenance; and minor improvement and modernization projects. It also funds institutional test aircraft depot level maintenance such as: Programmed Depot Maintenance (PDM), the calendar-based cyclic scheduling of aircraft into depots for update/inspection; modifications and any other depot level repairs required by the aircraft System Program Directors (SPD); engine overhauls; depot-provided area assistance; and assorted ground support equipment overhauls.

The AFTCs three test wings are supported by this project: (1) Arnold Engineering and Development Complex (AEDC), located at Arnold Air Force Base (AFB), TN, whose institutional test infrastructure supports operations of the largest complex of ground test facilities in the world (includes transonic, supersonic, and hypersonic wind tunnels; rocket motor and turbine engine test cells; space environmental test chambers, hyperballistic ranges; and other specialized facilities). Included are operations at the National Full-Scale Aerodynamic Complex (NFAC) located at NASA's AMES Research Center, California as well as operations at Tunnel 9 located at White Oak, Maryland.(2) 412 Test Wing (TW), located at Edwards AFB, CA, whose institutional test infrastructure supports weapons system development and operational test and evaluation for aircraft, aircraft subsystems and aircraft weapon systems, aerospace research vehicles, unmanned miniature vehicles, cruise missiles, parachute delivery/recovery systems, cargo handling systems, communications, information operations, and Electronic Warfare (EW) systems for DoD and allied forces. The 412TW mission includes the USAF Test Pilot School. (3) 96 TW, located at Eglin AFB, FL, is a joint test and training complex of 724 square miles of land area, and approximately 123,000 square miles of water area. 96TW provides the institutional test infrastructure required to conduct developmental and operational test and evaluation of non-nuclear air armaments (including aircraft guns, ammunition, and air-to-surface and air-to-air guided munitions); Command, Control, Communications, Computers and Intelligence/Surveillance/Reconnaissance (C4ISR) systems; target acquisition and weapon delivery systems; the McKinley Climatic Lab, multi-service climatic simulation capability, located at Eglin AFB, FL; and special operations aircraft systems. 96TW provides a scientific test process that supports the development, production, sustainment, and enhancement of munitions systems that support tri-service digital weapons development. T&E support services contracts are awarded on the basis of full and open competition.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> AEDC, 412TW, 96TW	655.226	679.947	724.692

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0605807F / <i>Test and Evaluation Support</i>	<b>Project (Number/Name)</b> 6606TS / <i>Test and Evaluation Support</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
<p><b>Description:</b> Provide infrastructure to support testing at Arnold Engineering and Development Complex (AEDC), the 412TW and USAF Test Pilot School at Edwards AFB, and the 96TW at Eglin AFB.</p> <p><b>FY 2020 Plans:</b> Total consists of utilities, contractor services, civilian pay, and the test and evaluation flying hour program.</p> <p><b>FY 2021 Plans:</b> Total consists of utilities, contractor services, civilian pay, and the test and evaluation flying hour program.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The \$45 million increase from FY20 to FY21 is a result of \$21 million in various favorable civ pay adjustments, \$1 million for B-21 manpower, \$8 million for the civ pay raise and FY21 performance awards and the \$15 million increase for natural disaster recovery efforts associated with Hurricane Michael.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	655.226	679.947	724.692

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Not applicable.



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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605826F / <i>Acq Workforce- Global Power</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	229.904	255.667	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
664127: <i>Acq Workforce - Direct</i>	-	229.904	255.667	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY21 PE 0605826F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct was transferred to PE 0605831F Acq Workforce Capability Integration, Project 665826, Acq Workforce Global Power.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This program element supports both civilian pay and non-pay support requirements.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	227.824	258.667	270.107	0.000	270.107
Current President's Budget	229.904	255.667	0.000	0.000	0.000
Total Adjustments	2.080	-3.000	-270.107	0.000	-270.107
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	-3.000			
• Reprogrammings	2.080	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-270.107	0.000	-270.107

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605826F / <i>Acq Workforce- Global Power</i>
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**Change Summary Explanation**

In FY19, the \$2.08M increase was due to an approved Above Threshold Reprogramming request. In FY20, the \$3M decrease was due to an Air Force requested transfer to PE 0605831F. In FY21, PE 0605826F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce-Capability Integration, Project 665826, Acq Workforce Global Power as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<p><b>Title:</b> Acquisition Workforce - Civilian Pay</p> <p><b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Power acquisition programs throughout their life cycle.</p> <p><b>FY 2020 Plans:</b> Fund the Global Power acquisition and product support workforce.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> In FY21, PE 0605826F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665826, Acq Workforce Global Power as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&amp;D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.</p>	229.842	248.410	0.000
<p><b>Title:</b> Acquisition Workforce - Non-Civilian Pay</p>	0.062	7.257	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605826F / <i>Acq Workforce- Global Power</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Power acquisition programs throughout their life cycle. This effort supports non-pay requirements associated with the acquisition workforce.</p> <p><b>FY 2020 Plans:</b> Fund the Global Power acquisition and product support workforce.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> In FY21, PE 0605826F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665826, Acq Workforce Global Power as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&amp;D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	229.904	255.667	0.000

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
N/A

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605827F / <i>Acq Workforce- Global Vig &amp; Combat Sys</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	243.647	249.992	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
664127: <i>Acq Workforce - Direct</i>	-	243.647	249.992	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY21 PE 0605827F, Acq Workforce Global Vigilance & Combat Systems, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F Acq Workforce Capability Integration, Project 665827, Acq Workforce Global Vigilance & Combat Systems.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	256.617	251.992	255.165	0.000	255.165
Current President's Budget	243.647	249.992	0.000	0.000	0.000
Total Adjustments	-12.970	-2.000	-255.165	0.000	-255.165
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	-2.000			
• Reprogrammings	-12.970	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-255.165	0.000	-255.165

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605827F / <i>Acq Workforce- Global Vig &amp; Combat Sys</i>
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**Change Summary Explanation**

In FY19, the \$12.970M decrease was due to an approved Above Threshold Reprogramming request. In FY20, the \$2.0M decrease was due to an Air Force requested transfer to PE 0605831F. In FY21, PE 0605827F, Acq Workforce Global Vigilance & Combat Systems, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665827, Global Vigilance & Combat Systems, as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring time lines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.

<b><u>C. Accomplishments/Planned Programs (\$ in Millions)</u></b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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<b><i>Title:</i></b> Acquisition Workforce - Civilian Pay	243.647	249.892	0.000
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***Description:*** The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Vigilance and Combat System acquisition programs throughout their life cycle.

***FY 2020 Plans:***  
Fund the Global Vigilance and Combat System acquisition and product support workforce.

***FY 2021 Plans:***  
N/A

***FY 2020 to FY 2021 Increase/Decrease Statement:***  
In FY21, PE 0605827F, Acq Workforce Global Vigilance & Combat Systems, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665827, Global Vigilance & Combat Systems, as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.

<b><i>Title:</i></b> Acquisition Workforce - Non-Civilian Pay	0.000	0.100	0.000
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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605827F / <i>Acq Workforce- Global Vig &amp; Combat Sys</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> The acquisition &amp; product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Vigilance and Combat System acquisition programs throughout their life cycle.</p> <p><b>FY 2020 Plans:</b> Fund the Global Vigilance and Combat System acquisition and product support workforce.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> In FY21, PE 0605827F, Acq Workforce Global Vigilance &amp; Combat Systems, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665827, Global Vigilance &amp; Combat Systems, as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&amp;D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	243.647	249.992	0.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

N/A

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605828F / <i>Acq Workforce- Global Reach</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	149.306	149.191	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
664127: <i>Acq Workforce - Direct</i>	-	149.306	149.191	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY21 PE 0605828F, Acq Workforce Global Reach, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665828, Acq Workforce Global Reach.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	149.586	149.191	152.459	0.000	152.459
Current President's Budget	149.306	149.191	0.000	0.000	0.000
Total Adjustments	-0.280	0.000	-152.459	0.000	-152.459
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-0.280	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-152.459	0.000	-152.459

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605828F / <i>Acq Workforce- Global Reach</i>
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**Change Summary Explanation**

In FY19, a \$0.280M decrease was due to an approved Above Threshold Reprogramming request. In FY21 PE 0605828F, Acq Workforce Global Reach, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665828, Acq Workforce Global Reach, as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<p><b>Title:</b> Acquisition Workforce - Civilian Pay</p> <p><b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Reach acquisition programs throughout their life cycle.</p> <p><b>FY 2020 Plans:</b> Fund the Global Reach acquisition and product support workforce.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> In FY21, PE 0605828F, Acq Workforce Global Reach, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665828, Acq Workforce Global Reach, as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&amp;D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.</p>	149.306	149.091	0.000
<p><b>Title:</b> Acquisition Workforce - Non-Civilian Pay</p>	0.000	0.100	0.000

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605828F / <i>Acq Workforce- Global Reach</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> The acquisition &amp; product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Reach acquisition programs throughout their life cycle.</p> <p><b>FY 2020 Plans:</b> Fund the Global Reach acquisition and product support workforce.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> In FY21, PE 0605828F, Acq Workforce Global Reach, Project 664127, Acq Workforce Direct, Non-Civilian Pay (\$0.100M) was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665828, Acq Workforce Global Reach, as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&amp;D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding,authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	149.306	149.191	0.000

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
N/A

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605829F / <i>Acq Workforce- Cyber, Network, &amp; Bus Sys</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	227.337	235.360	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
664127: <i>Acq Workforce - Direct</i>	-	227.337	235.360	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY21, PE 0605829F, Acq Workforce Cyber, Network, and Business Systems, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665829, Cyber, Network, and Business Systems.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	226.257	235.360	242.273	0.000	242.273
Current President's Budget	227.337	235.360	0.000	0.000	0.000
Total Adjustments	1.080	0.000	-242.273	0.000	-242.273
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.080	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-242.273	0.000	-242.273

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605829F / <i>Acq Workforce- Cyber, Network, &amp; Bus Sys</i>
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**Change Summary Explanation**

In FY19, the \$1.080M increase was due to an approved Above Threshold Reprogramming request. In FY21, PE 0605829F, Acq Workforce Cyber, Network, and Business Systems, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665829, Cyber, Network, and Business Systems, as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.

<b><u>C. Accomplishments/Planned Programs (\$ in Millions)</u></b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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<b><i>Title:</i></b> Acquisition Workforce - Civilian Pay	215.911	223.708	0.000
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***Description:*** The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Cyber, Network, and Business System acquisition programs throughout their life cycle.

***FY 2020 Plans:***

Fund the Cyber, Network, and Business Systems acquisition and product support workforce.

***FY 2021 Plans:***

N/A

***FY 2020 to FY 2021 Increase/Decrease Statement:***

In FY19, the \$1.080M increase was due to an approved Above Threshold request. In FY21, PE 0605829F, Acq Workforce Cyber, Network, and Business Systems, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665829, Cyber, Network, and Business Systems, as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.

<b><i>Title:</i></b> Acquisition Workforce - Non-Civilian Pay	11.426	11.652	0.000
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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605829F / <i>Acq Workforce- Cyber, Network, &amp; Bus Sys</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, technical and business capabilities needed to oversee Cyber, Network, and Business System acquisition programs throughout their life cycle.</p> <p><b>FY 2020 Plans:</b> Fund the Cyber, Network, and Business Systems acquisition and product support workforce.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> In FY21, PE 0605829F, Acq Workforce Cyber, Network, and Business Systems, Project 664127, Acq Workforce Direct, Non-Civilian Pay, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665829, Cyber, Network, and Business Systems, as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&amp;D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	227.337	235.360	0.000

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
N/A

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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605830F / <i>Acq Workforce- Global Battle Mgmt</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	157.258	160.196	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
664127: <i>Acq Workforce - Direct</i>	-	157.258	160.196	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY21, PE 0605830F, Acq Workforce Global Battle Management, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665830, Acq Workforce Global Battle Management.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	165.438	160.196	163.184	0.000	163.184
Current President's Budget	157.258	160.196	0.000	0.000	0.000
Total Adjustments	-8.180	0.000	-163.184	0.000	-163.184
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-8.180	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-163.184	0.000	-163.184

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605830F / <i>Acq Workforce- Global Battle Mgmt</i>
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**Change Summary Explanation**

In FY19, an Internal Reprogramming was accomplished moving \$3.617M from BA05, 0605830F, to BA06, 0605830F. Additionally, there was a decrease of \$11.797M due to an approved Above Threshold Reprogramming request. In FY21, PE 0605830F, Acq Workforce Global Battle Management, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665830, Acq Workforce Global Battle Management, as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<p><b>Title:</b> Acquisition Workforce - Civilian Pay</p> <p><b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Battle Management acquisition programs throughout their life cycle.</p> <p><b>FY 2020 Plans:</b> Fund the Global Battle Management acquisition and product support workforce.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> In FY21, PE 0605830F, Acq Workforce Global Battle Management, Project 664127, Acq Workforce Direct, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665830, Acq Workforce Global Battle Management, as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&amp;D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.</p>	157.258	160.096	0.000
<p><b>Title:</b> Acquisition Workforce - Non-Civilian Pay</p>	0.000	0.100	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0605830F / <i>Acq Workforce- Global Battle Mgmt</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> The acquisition &amp; product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Battle Management acquisition programs throughout their life cycle.</p> <p><b>FY 2020 Plans:</b> Fund the Global Battle Management acquisition and product support workforce.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> In FY21, PE 0605830F, Acq Workforce Global Battle Management, Project 664127, Acq Workforce Direct, Non-Civilian Pay, was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665830, Acq Workforce Global Battle Management, as part of the consolidation of eight AFLCMC Acq Workforce PEs into two PEs which more accurately reflect their contribution to one of two outputs and capabilities: Acq Workforce—Capability Integration and Acq Workforce—Management HQ-R&amp;D. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.</p>				
<b>Accomplishments/Planned Programs Subtotals</b>		157.258	160.196	0.000
<b>D. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>E. Acquisition Strategy</b>				
N/A				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force											Date: February 2020	
Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
3600: Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support					PE 0605831F I Acq Workforce- Capability Integration							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	237.297	228.255	1,362.038	0.000	1,362.038	1,389.584	1,380.771	1,386.865	1,359.492	Continuing	Continuing
664127: Acq Workforce - Direct	-	237.297	228.255	219.868	0.000	219.868	221.270	206.704	190.639	157.885	Continuing	Continuing
665826: acq workforce-global power	-	0.000	0.000	273.231	0.000	273.231	277.162	276.815	280.397	282.274	Continuing	Continuing
665827: Acq Workforce-Global Vig & Combat Sys	-	0.000	0.000	262.119	0.000	262.119	267.476	267.032	270.454	272.590	Continuing	Continuing
665828: Acq Workforce-Global Reach	-	0.000	0.000	158.429	0.000	158.429	161.605	161.338	163.405	164.695	Continuing	Continuing
665829: acq workforce-cyber network & bus sys	-	0.000	0.000	247.468	0.000	247.468	258.662	263.797	273.209	266.351	Continuing	Continuing
665830: Acq Workforce-Global Battle Mgmt	-	0.000	0.000	183.107	0.000	183.107	189.368	191.253	195.039	202.564	Continuing	Continuing
665832: Acq Workfoce-Advanced Prgm Technology	-	0.000	0.000	17.816	0.000	17.816	14.041	13.832	13.722	13.133	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

Program Element 0605831F is one of two direct funded AFLCMC acquisition workforce program elements. The other AFLCMC acquisition workforce civilian pay program element is 0605898F Management Headquarters.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

In FY21, the Air Force consolidated six of the eight previous AFLCMC program elements (0605826F, 0605827F, 0605828F, 0605829F, 0605830F, and 0605832F) into program element 0605831F Capability Integration. A database error prevented the Air Force from moving all funding in program element 0605832F Advanced Program Technology to program element 0605831F Acquisition Workforce Capability Integration. The Air Force requests a technical adjustment to realign the remaining program element 0605832F Advanced Program Technology funding (\$40.768M) to program element 0605831F Capability Integration, Project 665832 Advanced Program Technology.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605831F / <i>Acq Workforce- Capability Integration</i>
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The acq workforce program element consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions-in-force. The consolidation maintains transparency associated with funding, authorizations, and AWYC's due to the establishment of new Projects within the consolidated PE 0605831F Program.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	220.320	220.255	223.875	0.000	223.875
Current President's Budget	237.297	228.255	1,362.038	0.000	1,362.038
Total Adjustments	16.977	8.000	1,138.163	0.000	1,138.163
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	8.000			
• Reprogrammings	17.008	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.031	0.000	1,138.163	0.000	1,138.163

**Change Summary Explanation**

In FY19, the \$17.008M increase was due to an approved Above Threshold Reprogramming request. Additionally, a \$0.031M decrease was due to a requirement to fund a cancelled year RDT&E requirement. In FY20, an \$8M increase was due to an Air Force requested transfer from PEs 0605826F (\$3M), 0605827F (\$2M), and 0605832F (\$3M). The FY21 PB funds 9,838 authorizations. \$1,366.3M is budgeted for civilian pay (assumes technical adjustment of \$40.8M from PE 0605832F) and \$36.515M for non-pay requirements. The FY21 budgeted Average Work Year Cost (AWYC) is \$0.139M. The \$1,138.162M FY21 (FY20 PB) to FY21 (FY21 PB) increase is due to the AFLCMC acquisition workforce consolidation from eight to six program elements. The detailed change explanations are provided in the Project R-2A.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0605831F / <i>Acq Workforce- Capability Integration</i>	<b>Project (Number/Name)</b> 664127 / <i>Acq Workforce - Direct</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
664127: <i>Acq Workforce - Direct</i>	-	237.297	228.255	219.868	0.000	219.868	221.270	206.704	190.639	157.885	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This program element funds the AFLCMC civilian workforce in cross-cutting and mission support organizations such as Plans & Programs, Engineering, Contracting, Financial Management, Logistics, Program Management, Test, Intelligence, Safety, Personnel, Small Business, Inspector General, and Staff Judge Advocate. In addition, this program element funds the AFLCMC civilian workforce directly executing programs such as the Rapid Sustainment Office and the Cyber Resiliency Office for Weapon Systems. The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> Acquisition Workforce - Civilian Pay	219.859	210.651	202.055
<b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle.			
<b>FY 2020 Plans:</b> Fund the Capability Integration acquisition and product support workforce.			
<b>FY 2021 Plans:</b> Fund the Capability Integration acquisition and product support workforce.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY20 civilian pay budget is \$210.651M for 1,438 authorizations at an average work year cost of \$0.146M. The FY21 PB \$202.055M request in PE 0605831F Project 665826 supports 1,409 authorizations at an average work year cost (AWYC) of \$0.143M. The \$8.596M FY20 to FY21 decrease is a result of 29 fewer authorizations (\$4.2M decrease) and a \$0.003M AWYC decrease (\$4.4M decrease). The FY20 to FY21 29 authorization reduction is primarily driven by authorization reallocations within the Center.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0605831F / <i>Acq Workforce- Capability Integration</i>	<b>Project (Number/Name)</b> 664127 / <i>Acq Workforce - Direct</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
The AWYC has been updated based on FY19 actual costs and increases for the FY20 general pay raise (3.1%), FY21 civilian pay raise (2.1%), and the FY20 Federal Employee Retirement System agency matching increase.				
<b>Title:</b> Acquisition Workforce - Non-Civilian Pay		17.438	17.604	17.813
<b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Power acquisition programs throughout their life cycle. This effort supports non-pay requirements associated with the acquisition workforce.				
<b>FY 2020 Plans:</b> Fund the Capability Integration acquisition and product support workforce.				
<b>FY 2021 Plans:</b> Fund the Capability Integration acquisition and product support workforce.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY21 PB funds \$17.840M for non-pay requirements. The \$0.2M minor increase is due to inflation.				
<b>Accomplishments/Planned Programs Subtotals</b>		237.297	228.255	219.868
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b> N/A				



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0605831F / Acq Workforce- Capability Integration				<b>Project (Number/Name)</b> 665826 / acq workforce-global power			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
665826: acq workforce-global power	-	0.000	0.000	273.231	0.000	273.231	277.162	276.815	280.397	282.274	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY21 PE 0605826F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct was transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665826, Acq Workforce Global Power.

This program element funds the AFLCMC civilian workforce in the Fighters and Bombers Program Executive Office and the Armament Program Executive Office. AFLCMC equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this project will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This project supports both civilian pay and non-pay support requirements.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Acquisition Workforce - Civilian Pay	0.000	0.000	266.385
<b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical business capabilities needed to oversee Global Power acquisition programs throughout their life cycle.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> Fund the Global Power acquisition and product support workforce.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY20 civilian pay budget appropriated in PE 0605826F is \$248.410M for 1,908 authorizations at an average work year cost of \$0.130M. The FY21 PB \$266.385M request in PE 0605831F Project 0665826 supports 1,933 authorizations at an average work year cost (AWYC) of \$0.138M. The \$17.975M FY20 to FY21 increase is a result of 25 additional authorizations (\$3.5M increase) and a \$0.008M AWYC increase (\$14.5M increase).			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0605831F / <i>Acq Workforce- Capability Integration</i>	<b>Project (Number/Name)</b> 665826 / <i>acq workforce-global power</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>The FY20 (1,908 authorizations) to FY21 25 authorization increase is primarily driven by additional authorizations for the B-21 Long Range Strike Bomber program office.</p> <p>The AWYC has been updated based on FY19 actual costs and increases for the FY20 general pay raise (3.1%), FY21 civilian pay raise (2.1%), and the FY20 Federal Employee Retirement System agency matching increase.</p> <p><b>Title:</b> Acquisition Workforce - Non-Civilian Pay</p> <p><b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical business capabilities needed to oversee Global Power acquisition programs throughout their life cycle. This requirement supports non-civilian pay efforts.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> Fund the Global Power acquisition and product support workforce.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY20 non-pay appropriated amount in PE 0605826F was \$7.257M. The minimal decrease in requirements is related to the F-35 Fleet Management Office.</p>				
		0.000	0.000	6.846
<b>Accomplishments/Planned Programs Subtotals</b>		0.000	0.000	273.231
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0605831F / <i>Acq Workforce- Capability Integration</i>				<b>Project (Number/Name)</b> 665827 / <i>Acq Workforce-Global Vig &amp; Combat Sys</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
665827: <i>Acq Workforce-Global Vig &amp; Combat Sys</i>	-	0.000	0.000	262.119	0.000	262.119	267.476	267.032	270.454	272.590	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY21 PE 0605827F, Acq Workforce Global Vigilance and Combat Systems, Project 664127, Acq Workforce Direct was transferred to PE 0605831F Acq Workforce Capability Integration, Project 665826, Acq Workforce Global Vigilance and Combat Systems.

This program element funds the AFLCMC civilian workforce in the Intelligence, Surveillance, and Reconnaissance and Special Operations Forces Program Executive Office, Agile Combat Support Program Executive Office, and the Propulsion Directorate. AFLCMC equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this project will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This project supports both civilian pay and non-pay support requirements.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Acquisition Workforce - Civilian Pay	0.000	0.000	262.019
<b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical business capabilities needed to oversee Global Vigilance and Combat Systems acquisition programs throughout their life cycle.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> Fund the Global Vigilance and Combat Systems acquisition and product support workforce.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY20 civilian pay budget appropriated in PE 0605827F is \$249.892M for 1,959 authorizations at an average work year cost of \$0.128M. The FY21 PB \$262.119M request in PE 0605831F Project 665827 supports 1,959 authorizations at an average work year cost (AWYC) of \$0.134M. The \$12.227M FY20 to FY21 increase is a result of a \$0.006M AWYC increase (\$12.3M increase).			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0605831F / <i>Acq Workforce- Capability Integration</i>	<b>Project (Number/Name)</b> 665827 / <i>Acq Workforce-Global Vig &amp; Combat Sys</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
The AWYC has been updated based on FY19 actual costs and increases for the FY20 general pay raise (3.1%), FY21 civilian pay raise (2.1%), and the FY20 Federal Employee Retirement System agency matching increase.				
<b>Title:</b> Acquisition Workforce - Non-Civilian Pay		0.000	0.000	0.100
<b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical business capabilities needed to oversee Global Vigilance and Combat Systems acquisition programs throughout their life cycle. This requirement supports non-civilian pay efforts.				
<b>FY 2020 Plans:</b> N/A				
<b>FY 2021 Plans:</b> Fund the Global Vigilance and Combat Systems acquisition and product support workforce.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The non-pay requirements are unchanged from FY20 to FY21. The FY20 non-pay requirements in PE 0605827F was \$0.100M.				
<b>Accomplishments/Planned Programs Subtotals</b>		0.000	0.000	262.119
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b> N/A				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0605831F / Acq Workforce- Capability Integration				<b>Project (Number/Name)</b> 665828 / Acq Workforce-Global Reach			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
665828: Acq Workforce-Global Reach	-	0.000	0.000	158.429	0.000	158.429	161.605	161.338	163.405	164.695	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY21 PE 060582F, Acq Workforce Global Reach, Project 664127, Acq Workforce Direct was transferred to PE 0605831F Acq Workforce Capability Integration, Project 665826, Acq Workforce Global Reach.

This program element funds the AFLCMC civilian workforce in the Tanker Program Executive Office, Presidential Aircraft and Executive Airlift Program Executive Office, and the Mobility and Training Aircraft Program Executive Office. AFLCMC equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this project will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This project supports both civilian pay and non-pay support requirements.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Acquisition Workforce - Civilian Pay	0.000	0.000	158.329
<b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical business capabilities needed to oversee Global Reach acquisition programs throughout their life cycle.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> Fund the Global Reach acquisition and product support workforce.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY20 civilian pay budget appropriated in PE 0605828F is \$149.091M for 1,178 authorizations at an average work year cost of \$0.127M. The FY21 PB \$158.429M request in PE 0605831F Project 665828 supports 1,178 authorizations at an average work year cost (AWYC) of \$0.134M. The \$9.338M FY20 to FY21 increase is a result of a \$0.007M AWYC increase (\$9.4M increase).			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0605831F / <i>Acq Workforce- Capability Integration</i>	<b>Project (Number/Name)</b> 665828 / <i>Acq Workforce-Global Reach</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
The AWYC has been updated based on FY19 actual costs and increases for the FY20 general pay raise (3.1%), FY21 civilian pay raise (2.1%), and the FY20 Federal Employee Retirement System agency matching increase.				
<b>Title:</b> Acquisition Workforce - Non-Civilian Pay		0.000	0.000	0.100
<b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical business capabilities needed to oversee Global Reach acquisition programs throughout their life cycle. This requirement supports non-civilian pay efforts.				
<b>FY 2020 Plans:</b> N/A				
<b>FY 2021 Plans:</b> Fund the Global Reach acquisition and product support workforce.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The non-pay requirements are unchanged from FY20 to FY21. The FY20 non-pay requirements in PE 0605828F was \$0.100M.				
<b>Accomplishments/Planned Programs Subtotals</b>		0.000	0.000	158.429
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b> N/A				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0605831F / Acq Workforce- Capability Integration				<b>Project (Number/Name)</b> 665829 / acq workforce-cyber network & bus sys			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
665829: acq workforce-cyber network & bus sys	-	0.000	0.000	247.468	0.000	247.468	258.662	263.797	273.209	266.351	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY21 PE 0605829F, Acq Workforce Cyber, Network, and Business Systems, Project 664127, Acq Workforce Direct was transferred to PE 0605831F Acq Workforce Capability Integration, Project 665826, Acq Workforce Cyber, Network, and Business Systems.

This program element funds the AFLCMC civilian workforce in the Business and Enterprise Systems Program Executive Office and the Command, Control, Communications, and Intelligence Program Executive Office. AFLCMC equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this project will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This project supports both civilian pay and non-pay support requirements.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Acquisition Workforce - Civilian Pay	0.000	0.000	235.612
<b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical business capabilities needed to oversee Cyber, Network, and Business System acquisition programs throughout their life cycle.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> Fund the Cyber, Network, and Business Systems acquisition and product support workforce.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY20 civilian pay budget appropriated in PE 0605829F is \$223.708M for 1,724 authorizations at an average work year cost of \$0.130M. The FY21 PB \$235.612M request in PE 0605831F Project 665829 supports 1,669 authorizations at an average work year cost (AWYC) of \$0.141M. The \$11.9M FY20 to FY21 increase is a result of 55 less authorizations (\$7.8M decrease) and a \$0.011M AWYC increase (\$19.7M increase).			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0605831F / <i>Acq Workforce- Capability Integration</i>	<b>Project (Number/Name)</b> 665829 / <i>acq workforce-cyber network &amp; bus sys</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>The FY20 (1,724 authorizations) to FY21 55 authorization decrease is primarily driven by the Nuclear Command, Control, and Communications workload transition to the Air Force Nuclear Weapons Center.</p> <p>The AWYC has been updated based on FY19 actual costs and increases for the FY20 general pay raise (3.1%), FY21 civilian pay raise (2.1%), and the FY20 Federal Employee Retirement System agency matching increase.</p> <p><b>Title:</b> Acquisition Workforce - Non-Civilian Pay</p> <p><b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical business capabilities needed to oversee Cyber, Network, and Business System acquisition programs throughout their life cycle. This requirement supports non-civilian pay efforts.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> Fund the Cyber, Network, and Business Systems acquisition and product support workforce.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The appropriated FY20 non-pay budget in PE 0605829F was \$11.652M. The FY20 to FY21 \$0.209M increase is due to inflation.</p>				
		0.000	0.000	11.856
<b>Accomplishments/Planned Programs Subtotals</b>		0.000	0.000	247.468
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0605831F / Acq Workforce- Capability Integration				<b>Project (Number/Name)</b> 665830 / Acq Workforce-Global Battle Mgmt			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
665830: Acq Workforce-Global Battle Mgmt	-	0.000	0.000	183.107	0.000	183.107	189.368	191.253	195.039	202.564	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY21 PE 0605830F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct was transferred to PE 0605831F Acq Workforce Capability Integration, Project 665830, Acq Workforce Global Battle Management.

This program element funds the AFLCMC civilian workforce in the Digital Program Executive Office. AFLCMC equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this project will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This project supports both civilian pay and non-pay support requirements.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Acquisition Workforce - Civilian Pay	0.000	0.000	183.007
<b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical business capabilities needed to oversee Global Battle Management acquisition programs throughout their life cycle.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> Fund the Global Battle Management acquisition and product support workforce.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY20 civilian pay budget appropriated in PE 0605830F is \$160.096M for 1,231 authorizations at an average work year cost of \$0.130M. The FY21 PB \$183.107M request in PE 0605831F Project 665830 supports 1,273 authorizations at an average work year cost (AWYC) of \$0.143M. The \$23.011M FY20 to FY21 increase is a result of 42 additional authorizations (\$6.0M increase) and a \$0.013M AWYC increase (\$17.0M increase). The FY20 to FY21 42 authorization increase is primarily driven by additional authorizations for the Multi-Domain Command and Control Architecture (MDC2) program office and workload transitions within the Center.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0605831F / <i>Acq Workforce- Capability Integration</i>	<b>Project (Number/Name)</b> 665830 / <i>Acq Workforce-Global Battle Mgmt</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
The AWYC has been updated based on FY19 actual costs and increases for the FY20 general pay raise (3.1%), FY21 civilian pay raise (2.1%), and the FY20 Federal Employee Retirement System agency matching increase.			
<b>Title:</b> Acquisition Workforce - Non-Civilian Pay <b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical business capabilities needed to oversee Global Battle Management acquisition programs throughout their life cycle. This requirement supports non-civilian pay efforts. <b>FY 2020 Plans:</b> N/A <b>FY 2021 Plans:</b> Fund the Global Battle Management acquisition and product support workforce. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The non-pay requirements are unchanged from FY20 to FY21. The FY20 non-pay requirements in PE 0605830F was \$0.100M.	0.000	0.000	0.100
<b>Accomplishments/Planned Programs Subtotals</b>	0.000	0.000	183.107

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0605831F / <i>Acq Workforce- Capability Integration</i>				<b>Project (Number/Name)</b> 665832 / <i>Acq Workfoce-Advanced Prgm Technology</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
665832: <i>Acq Workfoce-Advanced Prgm Technology</i>	-	0.000	0.000	17.816	0.000	17.816	14.041	13.832	13.722	13.133	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY21 PE 0605832F, Acq Workforce Advanced Program Technology, Project 664127, Acq Workforce Direct was partially transferred to PE 0605831F Acq Workforce Capability Integration, Project 665832, Acq Workforce Advanced Program Technology.

A database error prevented the Air Force from moving all funding in program element 0605832F Advanced Program Technology to program element 0605831F Acquisition Workforce Capability Integration. The Air Force requests a technical adjustment to realign the remaining program element 0605832F Advanced Program Technology funding (\$40.768M) to program element 0605831F Capability Integration, Project 665832 Advanced Program Technology.

This program element funds the AFLCMC civilian workforce supporting Special Access Programs across the Center. AFLCMC equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this project will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This project supports both civilian pay and non-pay support requirements.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Acquisition Workforce - Civilian Pay	0.000	0.000	17.716
<b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Advanced Program Technology acquisition programs throughout their life cycle.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> Fund the Advanced Program Technology acquisition and product support workforce.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY20 civilian pay budget is \$42.292 for 286 authorizations at an average work year cost of \$0.148M. The FY21 PB request (assuming approval of the technical adjustment request) is \$58.584M (\$17.716M in this PE plus \$40.768M technical adjustment) supports 417 authorizations at an average work year cost (AWYC) of \$0.140M.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0605831F / <i>Acq Workforce- Capability Integration</i>	<b>Project (Number/Name)</b> 665832 / <i>Acq Workfoce-Advanced Prgm Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>The \$16.292M FY20 to FY21 increase is a result of 131 additional authorizations (\$18.4M increase) and a \$0.008M AWYC decrease (\$2.1M decrease).                      The FY20 to FY21 131 authorization increase is driven by the realignment of all SAP related authorizations to this program element and project.                      The AWYC has been updated based on FY19 actual costs and increases for the FY20 general pay raise (3.1%), FY21 civilian pay raise (2.1%), and the FY20 Federal Employee Retirement System agency matching increase.</p>				
<p><b>Title:</b> Acquisition Workforce - Non-Civilian Pay  <b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Power acquisition programs throughout their life cycle. This effort supports non-pay requirements associated with the acquisition workforce.  <b>FY 2020 Plans:</b>                      Fund the Advanced Program Technology acquisition and product support workforce.  <b>FY 2021 Plans:</b>                      Fund the Advanced Program Technology acquisition and product support workforce.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>                      The non-pay requirements are unchanged from FY20 to FY21. The FY20 non-pay requirements in PE 0605832F was \$0.100M</p>		0.000	0.000	0.100
<b>Accomplishments/Planned Programs Subtotals</b>		0.000	0.000	17.816
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605832F / <i>Acq Workforce - Advanced Program Technology</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	36.739	39.392	40.768	0.000	40.768	45.541	45.635	46.478	47.455	Continuing	Continuing
664127: <i>Acq Workforce - Direct</i>	-	36.739	39.392	40.768	0.000	40.768	45.541	45.635	46.478	47.455	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY21 PE 0605832F, Acq Workforce Advanced Program Technology, Project 668532, Acq Workforce Direct was intended to be fully transferred to PE 0605831F, Acq Workforce Capability Integration, Project 665832, Acq Workforce Advanced Program Technology. A database error prevented the Air Force from moving all funding in program element 0605832F Advanced Program Technology to program element 0605831F Acquisition Workforce Capability Integration. The Air Force requests a technical adjustment to realign the remaining program element 0605832F Advanced Program Technology funding (\$40.768M) to program element 0605831F Capability Integration, Project 665832 Advanced Program Technology.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	37.399	42.392	43.266	0.000	43.266
Current President's Budget	36.739	39.392	40.768	0.000	40.768
Total Adjustments	-0.660	-3.000	-2.498	0.000	-2.498
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.660	-3.000	-2.498	0.000	-2.498

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605832F / <i>Acq Workforce - Advanced Program Technology</i>
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**Change Summary Explanation**

Please reference PE 0605831F Acq Workforce Capability Integration, Project 665832 Advanced Program Technology for an explanation of the FY21 (FY20 PB) to FY21 (FY21 PB) changes.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<p><b>Title:</b> Acquisition Workforce - Civilian Pay</p> <p><b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Advanced Program Technology acquisition programs throughout their life cycle.</p> <p><b>FY 2020 Plans:</b> Fund the Advanced Program Technology acquisition and product support workforce.</p> <p><b>FY 2021 Plans:</b> Advanced Program Technology acquisition and support workforce.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Please reference PE 0605831F Acq Workforce Capability Integration, Project 665832 Advanced Program Technology for an explanation of the FY20 to FY21 changes.</p>	36.739	39.292	40.668
<p><b>Title:</b> Acquisition Workforce - Non-Civilian Pay</p> <p><b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Power acquisition programs throughout their life cycle. This effort supports non-pay requirements associated with the acquisition workforce.</p> <p><b>FY 2020 Plans:</b> Fund the Advanced Program Technology acquisition and product support workforce.</p> <p><b>FY 2021 Plans:</b> Fund the Advanced Program Technology acquisition and product support workforce.</p>	0.000	0.100	0.100
<b>Accomplishments/Planned Programs Subtotals</b>	36.739	39.392	40.768

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605832F / <i>Acq Workforce - Advanced Program Technology</i>
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**E. Acquisition Strategy**  
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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605833F / <i>Acq Workforce- Nuclear Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	126.681	133.231	179.646	0.000	179.646	223.588	269.728	334.057	418.571	Continuing	Continuing
664127: <i>ACQ Workforce - Direct</i>	-	126.681	133.231	179.646	0.000	179.646	223.588	269.728	334.057	418.571	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This program element directly funds the Air Force Nuclear Weapons Center (AFNWC) acquisition workforce.

The AFNWC equips U.S. forces with operational Nuclear Systems weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Nuclear Systems acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b><u>B. Program Change Summary (\$ in Millions)</u></b>	<b><u>FY 2019</u></b>	<b><u>FY 2020</u></b>	<b><u>FY 2021 Base</u></b>	<b><u>FY 2021 OCO</u></b>	<b><u>FY 2021 Total</u></b>
Previous President's Budget	122.481	133.231	144.650	0.000	144.650
Current President's Budget	126.681	133.231	179.646	0.000	179.646
Total Adjustments	4.200	0.000	34.996	0.000	34.996
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	4.200	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	34.996	0.000	34.996

**Change Summary Explanation**

In FY19, \$3.280M is the Nuclear Systems percentage of a shared Congressional Mark for "unjustified growth" spread across all Acquisition Workforce program elements.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605833F / <i>Acq Workforce- Nuclear Systems</i>
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FY19 OMNIBUS Fourth Implementation - Part I sourced \$4.2M rectifying AFNWC Civilian Pay shortfall.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><b>Title:</b> Acquisition Workforce</p> <p><b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Nuclear Systems acquisition programs throughout their life cycle.</p> <p><b>FY 2020 Plans:</b> Continue to fund the Nuclear Systems acquisition and product support workforce. Includes civ pay and non-pay.</p> <p><b>FY 2021 Base Plans:</b> Continue to fund the Nuclear Systems acquisition and product support workforce. Includes civ pay and non-pay.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase of 948 to 1050 funded civilian positions.</p>	126.681	133.231	173.646	0.000	173.646
<p><b>Title:</b> AFNWC Management Support</p> <p><b>Description:</b> Provides resources for non-pay AFNWC Management Support providing continuous cutting edge nuclear weapon systems, sustainment capabilities, management, tools, and technical and business capabilities needed to oversee Nuclear Weapons acquisition programs throughout their life cycle. =</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Base Plans:</b> Continue day-to-day operations support for HQ AFNWC Staff such as IT support, A&amp;AS contract support, travel, supplies, temporary duty travel, operations and material support contract costs for nuclear system engineering and maintenance.</p> <p><b>FY 2021 OCO Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>	0.000	0.000	6.000	0.000	6.000

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605833F / <i>Acq Workforce- Nuclear Systems</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Funding moves from O&M into RDT&E in FY21					
<b>Accomplishments/Planned Programs Subtotals</b>	126.681	133.231	179.646	0.000	179.646

**D. Other Program Funding Summary (\$ in Millions)**  
 N/A

**Remarks**  
 FY21-25: \$80.962M increase due to 1) Transfer of NC3 personnel from AFLCMC PEs into AFNWC PE and 2) AFNWC Management Headquarters Support funds transitioning from 3400 O&M to 3600 RDT&E beginning FY21,

**E. Acquisition Strategy**  
 N/A

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605898F / <i>Management HQ - R&amp;D</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	11.024	5.590	5.734	0.000	5.734	3.896	4.055	4.207	4.296	Continuing	Continuing
6606TS: <i>Test and Evaluation Support</i>	-	4.655	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
664127: <i>ACQ Workforce - Direct</i>	-	6.369	5.590	5.734	0.000	5.734	3.896	4.055	4.207	4.296	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

The Management Headquarters program element 0605898F includes management headquarters personnel for Air Force Life Cycle Management Center. Air Force Life Cycle Management Center personnel are included in Budget Program Activity Code 664127.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This program element supports both civilian pay and non-pay support requirements.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	10.364	5.590	3.604	0.000	3.604
Current President's Budget	11.024	5.590	5.734	0.000	5.734
Total Adjustments	0.660	0.000	2.130	0.000	2.130
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.660	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	2.130	0.000	2.130

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605898F / <i>Management HQ - R&amp;D</i>
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**Change Summary Explanation**

The \$2.130M FY21 (FY20 PB) to FY21 (FY21 PB) increase is due to funding the 38 authorizations to the \$0.144M average work year cost.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0605898F / Management HQ - R&D	<b>Project (Number/Name)</b> 6606TS / Test and Evaluation Support
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
6606TS: <i>Test and Evaluation Support</i>	-	4.655	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This program element includes Air Force Flight Test Center management headquarters personnel to lead, guide and direct the operation of the Air Force Test Center (AFTC) test activities which are included in the Department of Defense (DoD) Major Range and Test Facility Base (MRTFB).

Test and Evaluation (T&E) Support funds institutional test infrastructure activities including: Command and supervisory staffs; supply stocks; maintenance, repair, and replacement of worn or obsolete test equipment and facilities; test infrastructure for data collection, transmission, reduction, and analysis; civilian salaries; temporary duty travel; range operations and material support contract costs for hardware and software engineering and maintenance; and minor improvement and modernization projects. It also funds institutional test aircraft depot level maintenance such as: Programmed Depot Maintenance (PDM), the calendar-based cyclic scheduling of aircraft into depots for update/inspection; modifications and any other depot level repairs required by the aircraft System Program Directors (SPD); engine overhauls; depot-provided area assistance; and assorted ground support equipment overhauls.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<b>Title:</b> Test and Evaluation Support	4.655	0.000	0.000
<b>Description:</b> Air Force Flight Test Center management headquarters personnel.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> Air Force Flight Test Center management headquarters personnel			
<b>Accomplishments/Planned Programs Subtotals</b>	4.655	0.000	0.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0605898F / Management HQ - R&D				<b>Project (Number/Name)</b> 664127 / ACQ Workforce - Direct			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
664127: ACQ Workforce - Direct	-	6.369	5.590	5.734	0.000	5.734	3.896	4.055	4.207	4.296	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Management Headquarters program element 0605898F includes management headquarters personnel for Air Force Life Cycle management Center. Air Force Life Cycle Management Center personnel are included in Budget Program Activity Code 664127.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This program element supports both civilian pay and non-pay support requirements.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Acquisition Workforce - Civilian Pay</p> <p><b>Description:</b> Life Cycle Management Center management headquarters personnel.</p> <p><b>FY 2020 Plans:</b> Life Cycle Management Center management headquarters personnel.</p> <p><b>FY 2021 Plans:</b> Life Cycle Management Center management headquarters personnel.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY20 PB and FY21 PB support 38 authorizations. The \$0.144M FY20 to FY21 increase is due to AWYC updates based on actual FY19 costs, the FY20 civilian pay raise (3.1%), the FY21 civilian pay raise (2.1%) and the FY20 Federal Employee Retirement System agency matching increase.</p>	6.369	5.490	5.634
<p><b>Title:</b> Acquisition Workforce - Non-Civilian Pay</p> <p><b>Description:</b> The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Power acquisition programs throughout their life cycle. This effort supports non-pay requirements associated with the acquisition workforce.</p> <p><b>FY 2020 Plans:</b></p>	0.000	0.100	0.100



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0605898F / <i>Management HQ - R&amp;D</i>	<b>Project (Number/Name)</b> 664127 / <i>ACQ Workforce - Direct</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
Life Cycle Management Center management headquarters personnel.			
<b><i>FY 2021 Plans:</i></b> Fund Life Cycle Management Center management headquarters workforce.			
<b>Accomplishments/Planned Programs Subtotals</b>	6.369	5.590	5.734

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605976F / <i>Facilities Restoration and Modernization - Test and Evaluation Support</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	187.216	88.445	70.985	0.000	70.985	70.622	71.888	73.173	74.520	Continuing	Continuing
6606MC: <i>Facility Restoration and Modernization - T&amp;E</i>	-	187.216	88.445	70.985	0.000	70.985	70.622	71.888	73.173	74.520	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Restoration includes repair and replacement work to restore damaged facilities due to accident or failure attributable to inadequate sustainment, excessive age, or other causes. Modernization includes alteration of facilities to implement a new, higher standard (including regulatory changes), to accommodate new functions, or to replace building components that typically last more than 50 years (such as foundations and structural components). Other tasks associated with facilities operations (such as custodial services, grass cutting, and the provision of central utilities) are not included. These restoration/modernization funds support the following Air Force test organizations and their associated test and evaluation facilities, including: remote locations, the 96th Test Wing (TW) at Eglin AFB, FL, Arnold Engineering and Development Complex (AEDC) at Arnold AFB, TN, including AEDC's 704th Test Group (TG) at Holloman AFB, NM, 704 TG Landing Gear Test Facility (LGTF) at Wright-Patterson AFB, OH, AEDC's Hypersonic Wind Tunnel 9 at White Oak, MD, AEDC's National Full-Scale Aerodynamics Complex (NFAC) at Moffett Field, CA, AEDC's McKinley Climatic Lab (MCL) at Eglin AFB, FL, and the 412th TW at Edwards AFB, CA.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	187.216	88.445	69.293	0.000	69.293
Current President's Budget	187.216	88.445	70.985	0.000	70.985
Total Adjustments	0.000	0.000	1.692	0.000	1.692
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	1.692	0.000	1.692

**Change Summary Explanation**

FY21: \$1.8 million increase provides funding for natural disaster recovery efforts associated with Hurricane Michael.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0605976F / <i>Facilities Restoration and Modernization - Test and Evaluation Support</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Facility restoration and modernization at the 96 TW</p> <p><b>Description:</b> Facility restoration and modernization at the 96th TW.</p> <p><b>FY 2020 Plans:</b> Continue Restoration and Modernization (R&amp;M) efforts across the range complex including Heating, Ventilation and Air Conditioning (HVAC) systems, repair/replace lightning protection systems, repair/replace fire protection systems and corrosion control.</p> <p><b>FY 2021 Plans:</b> Continue Restoration and Modernization (R&amp;M) efforts across the range complex including Heating, Ventilation and Air Conditioning (HVAC) systems, repair/replace lightning protection systems, repair/replace fire protection systems and corrosion control. Additional \$1.8 million provided to assist with natural disaster recovery efforts associated with Hurricane Michael.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> \$1.2 million increase is for improvements to range facilities and capabilities. Projects include: repairs to Range Road 201, Facility 12010 and Bridge Facility 12234, and widening Bridge Facility 12201 and Range Road 234. Additional \$1.8M associated with Hurricane Michael recovery efforts.</p>		14.897	3.623	6.673
<p><b>Title:</b> Facility restoration and modernization at AEDC</p> <p><b>Description:</b> Facility restoration and modernization at AEDC.</p> <p><b>FY 2020 Plans:</b> AEDC Service Life Extension Projects (SLEPs) to restore and modernize the Propulsion Wind Tunnel (PWT), Von Karman Facility (VKF), and Engine Test Facility (ETF) infrastructure begin to wind-down as they near completion. Continue design/construction of FY20 SLEP efforts using Facilities Acquisitions for Restoration and Modernization (FARM) and other contracts. Continue award of contracts for additional SLEPs Task Orders (TOs) to be executed during FY20-FY21 facilities outages. Continue to perform second and third level maintenance to restore ground test facilities to operational status. Complete VKF High Pressure Air Dryer replacement. Repair and modernize the 25 KGPM pump at the Primary Pumping Station. Complete modernization of B-Plant Test Environment Control System. Begin restoration of J-5 Exhaust System. Fund the Holloman High Speed Test Track Rail Refurbishment Design Plan and the National Radar Cross Section (RCS) Test Facility (NRTF) transfer switch for the RCS Advanced Measurement System (RAMS) generator.</p> <p><b>FY 2021 Plans:</b> Complete execution of the three remaining AEDC SLEPs to restore and modernize the PWT, VKF, &amp; ETF infrastructure. Continue construction/installation of FY21 SLEP efforts using Facilities Acquisitions for Restoration and Modernization (FARM) and</p>		150.292	79.193	58.736

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support	<b>R-1 Program Element (Number/Name)</b> PE 0605976F I Facilities Restoration and Modernization - Test and Evaluation Support
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
other contracts. Continue to perform second and third level maintenance to restore ground test facilities to operational status. Complete restoration of the J-5 Exhaust system. Continue refurbish of VKF valves to ensure continued operation of Tunnels ABC. AEDC will fund the Landing Gear Test Facility (LGTf) Control System Modernization for the 84" and 120" dynamotor and the Tire Force Machine (TFM); the NRTF Fire Protection Reservoir Liner; and Replace the HVAC for the Central Inertial GPS Test Facility (CIGTF) machine shop and industrial complex.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> \$20 million decrease is a result of three major SLEP projects associated with the FY17 \$350 million AF FYDP investment nearing completion.			
<b>Title:</b> Facility restoration and modernization at 412 TW  <b>Description:</b> Facility restoration and modernization at the 412 TW.  <b>FY 2020 Plans:</b> FY 2020 plans include upgrade and restoration of T&E facilities, including but not limited to, Hydraulic Unit Upgrade B1030; Power Supply for System Under Test Power B1030; Bathroom Renovations B1030 (North and South Tower); replace Radio Frequency (RF) Shielded Manddoors B1030; Seismic Upgrade Mission Control Center (MCC) 1440; Repair/Install Anti-terrorism/ Force Protection for MCC 1440; and Phase 2 Chamber Deluge System Replacement/Upgrade (includes RAM 24").  <b>FY 2021 Plans:</b> The FY21 plans include continuation of the upgrade and restoration of T&E facilities, such as but not limited to, Hydraulic Unit Upgrade B1030; Power Supply for System Under Test Power B1030; modernize electrical system components that have reached end of service life B1020; remediate B1830 fire safety deficiencies; and Seismic Upgrade.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Not applicable.	22.027	5.629	5.576
<b>Accomplishments/Planned Programs Subtotals</b>	187.216	88.445	70.985

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0604256F: <i>Threat Simulator Development</i>	33.666	59.693	57.725	-	57.725	44.777	36.511	31.655	32.237	Continuing	Continuing
• RDTE 06 PE 0604759F: <i>Major T&amp;E Investment</i>	213.273	106.663	208.680	-	208.680	207.845	152.044	159.017	155.705	Continuing	Continuing

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605976F / <i>Facilities Restoration and Modernization - Test and Evaluation Support</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0605807F: <i>Test and Evaluation Support</i>	692.784	717.895	764.606	-	764.606	767.210	766.092	780.181	789.744	Continuing	Continuing
• RDTE 06 PE 0605978F: <i>Facility Sustainment - T&amp;E Support</i>	28.888	29.424	29.880	-	29.880	30.509	31.056	31.612	32.193	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**

N/A.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605978F / <i>Facilities Sustainment - Test and Evaluation Support</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	28.888	29.424	29.880	0.000	29.880	30.509	31.056	31.612	32.193	Continuing	Continuing
6606MR: <i>Facility Sustainment-T&amp;E Support</i>	-	28.888	29.424	29.880	0.000	29.880	30.509	31.056	31.612	32.193	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Provides resources for sustainment activities required for an inventory of Air Force Material Command (AFMC) Test and Evaluation (T&E) facilities. Facility sustainment includes regularly scheduled adjustments and inspections, preventative maintenance tasks, and emergency response and service calls for minor repairs. It also includes major repairs or replacement of facility components that are expected to occur periodically. In addition to standard facility sustainment, such as roof replacement, refinishing of wall and floor surfaces, and repairing and replacing of heating and cooling systems, this work includes inspections and repairs of heavy plant machinery in large industrial facilities. This work includes, but is not limited to, inspection and repair of high-power electrical switching gear, hydraulic, lubrication, forced-air and fluid cooling systems, high pressure vessel health monitoring, facility control and remote monitoring systems, liquid oxygen systems, steam systems, test instrumentation, and fire detection and suppression systems. Other tasks associated with facilities operations (such as custodial services, grass cutting, and landscaping, waste disposal, and the provision of central utilities) are not included. These sustainment funds support the following Air Force organizations and their associated test and evaluation facilities, including: remote locations, the 96th Test Wing (TW) at Eglin AFB, FL, Arnold Engineering and Development Complex (AEDC) at Arnold AFB, TN, AEDC's 704th Test Group (TG) at Holloman AFB, NM, AEDC's 704 TG Landing Gear Test Facility (LGTf) at Wright-Patterson AFB, OH, AEDC's Hypersonic Wind Tunnel 9 at White Oak, MD, AEDC's National Full-Scale Aerodynamics Complex (NFAC) at Moffett Field, CA, AEDC's McKinley Climatic Laboratory (MCL) at Eglin AFB, FL and the 412 Test Wing (TW) at Edwards AFB, CA.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support	<b>R-1 Program Element (Number/Name)</b> PE 0605978F I Facilities Sustainment - Test and Evaluation Support
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	28.888	29.424	29.935	0.000	29.935
Current President's Budget	28.888	29.424	29.880	0.000	29.880
Total Adjustments	0.000	0.000	-0.055	0.000	-0.055
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-0.055	0.000	-0.055

**Change Summary Explanation**

Not applicable.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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<p><b>Title:</b> Facility sustainment at the 96 TW.</p> <p><b>Description:</b> Facility sustainment at the 96 TW.</p> <p><b>FY 2020 Plans:</b> Continue to work through several hundred Direct Scheduled Work Orders (DSWs) within the test infrastructure.</p> <p><b>FY 2021 Plans:</b> Continue to work through several hundred Direct Scheduled Work Orders (DSWs) within the test infrastructure.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Not applicable.</p>	0.811	0.983	1.005
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<p><b>Title:</b> Facility sustainment at the AEDC.</p> <p><b>Description:</b> Facility sustainment at the AEDC.</p> <p><b>FY 2020 Plans:</b> Continue to perform calendar based scheduled preventative maintenance on Engine Test Facility Plant and associated engine test cells, Propulsion Wind Tunnel Plant and associated wind tunnels, Von Karman Facility (VKF) Plant Core and associated test cells, arc heaters, rocket test facility, space chambers, and hypersonic engine test facilities, along with associated infrastructure</p>	25.650	25.782	26.173
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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605978F / <i>Facilities Sustainment - Test and Evaluation Support</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
that supports all test operations. Sustainment project includes painting buildings, carpet replacement, heating, ventilation, air conditioning (HVAC) repairs and roof repairs throughout the 704 TG.  <b>FY 2021 Plans:</b> Continue to perform calendar based scheduled preventative maintenance on Engine Test Facility Plant and associated engine test cells, Propulsion Wind Tunnel Plant and associated wind tunnels, Von Karman Facility (VKF) Plant Core and associated test cells, arc heaters, rocket test facility, space chambers, and hypersonic engine test facilities, along with associated infrastructure that supports all test operations. Sustainment project includes painting buildings, carpet replacement, heating, ventilation, air conditioning (HVAC) repairs and roof repairs throughout the 704 TG.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Not applicable.			
<b>Title:</b> Facility sustainment at the 412 TW.  <b>Description:</b> Facility sustainment at the 412 TW.  <b>FY 2020 Plans:</b> Continue sustainment of test unique infrastructure in 412 TW Electronic Warfare, Range, and other T&E facilities located at Edwards AFB, CA.  <b>FY 2021 Plans:</b> Continue sustainment of test unique infrastructure in 412 TW Electronic Warfare, Range, and other T&E facilities located at Edwards AFB, CA.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Not applicable.	2.427	2.659	2.702
<b>Accomplishments/Planned Programs Subtotals</b>	28.888	29.424	29.880

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0604256F: <i>Threat Simulator Development</i>	33.666	59.693	57.725	-	57.725	44.777	36.511	31.655	32.237	Continuing	Continuing
• RDTE 06 PE 0604759F: <i>Major T&amp;E Investment</i>	213.273	106.663	208.680	-	208.680	207.845	152.044	159.017	155.705	Continuing	Continuing

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0605978F / <i>Facilities Sustainment - Test and Evaluation Support</i>
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**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0605807F: <i>Test &amp; Evaluation Support</i>	692.784	717.895	764.606	-	764.606	767.210	766.092	780.181	789.744	Continuing	Continuing
• RDTE 06 PE 0605976F: <i>Facility Restoration and Modernization-T&amp;E</i>	187.216	88.445	70.985	-	70.985	70.622	71.888	73.173	74.520	Continuing	Continuing

**Remarks**

**E. Acquisition Strategy**

N/A

**UNCLASSIFIED**

**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0606017F / <i>Requirements Analysis and Maturation</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	46.145	86.715	63.381	0.000	63.381	58.847	51.505	41.128	41.886	Continuing	Continuing
666157: <i>Development Planning</i>	-	23.082	35.533	12.049	0.000	12.049	12.842	13.012	13.245	13.490	Continuing	Continuing
666158: <i>INTEGRATED SIMULATION AND ANALYSIS</i>	-	23.063	51.182	51.332	0.000	51.332	46.005	38.493	27.883	28.396	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

The Requirements Analysis and Maturation (RAM) program funds development planning (DP) to include early systems engineering and integrated simulation and analysis. These activities include requirements analysis, capability decomposition and trade space characterization, concept development (system of systems, air, space, and cyber) and architecture design and development, cost analysis, modeling and simulation of representative or prototype systems, and analytical tools. Outcomes of these activities are technologically informed requirements, mature concepts that are technically feasible, and areas for science and technology (S&T) investment to reduce technology risks. These activities provide the Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTMLPF-P) analytic basis for cost and capability trades driving non-materiel and/or materiel solutions. Early-phase systems engineering and technical planning activities funded by this program provide the foundation for informed investment decisions leading to successful acquisition programs. Development planning efforts are coordinated with the Air Force Capability Development Council, Air Force Warfighting Integration Capability (AFWIC), and/or SAF/AQ to ensure funding supports the highest Air Force priorities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver development planning and integrated simulation and analysis capabilities (to include Simulation and Analysis Facility (SIMAF) support and Joint Simulation Environment (JSE) capability). The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0606017F / <i>Requirements Analysis and Maturation</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	48.070	62.715	67.731	0.000	67.731
Current President's Budget	46.145	86.715	63.381	0.000	63.381
Total Adjustments	-1.925	24.000	-4.350	0.000	-4.350
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	24.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.379	0.000			
• Other Adjustments	-0.546	0.000	-4.350	0.000	-4.350

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project: 666157: *Development Planning***

Congressional Add: *Program Increase - Nuclear Modernization Analytics*

Congressional Add: *Program Increase - Nuclear Deterrence Research*

Congressional Add: *Unfunded Requirement - Development Planning*

Congressional Add Subtotals for Project: 666157

	<b>FY 2019</b>	<b>FY 2020</b>
	7.772	8.000
	4.857	10.000
	0.000	2.000
	12.629	20.000
	0.000	4.000
	0.000	4.000
	12.629	24.000

**Project: 666158: *INTEGRATED SIMULATION AND ANALYSIS***

Congressional Add: *Unfunded Requirement - Integrated Simulation and Analysis*

Congressional Add Subtotals for Project: 666158

Congressional Add Totals for all Projects

**Change Summary Explanation**

Decrease in FY 2021 due to civilian pay reprice adjustments.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0606017F / <i>Requirements Analysis and Maturation</i>	<b>Project (Number/Name)</b> 666157 / <i>Development Planning</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
666157: <i>Development Planning</i>	-	23.082	35.533	12.049	0.000	12.049	12.842	13.012	13.245	13.490	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Development Planning (DP) project funds activities to analyze Air Force capability needs and requirements to identify potential shortfalls and opportunities; formulate candidate concepts and solution options to address Air Force capability needs and shortfalls; and conduct coordinated analysis and assessment activities to address requirements, technology needs, capability trades, schedule, cost, and pre-systems acquisition planning. Emphasis is placed on activities to inform strategic planning and operational experimentation, analyzing multi-domain capabilities that look first at non-materiel solutions before generating materiel needs and requirements.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021
<p><b>Title:</b> Future Capability Analyses</p> <p><b>Description:</b> Conduct capability analyses by analyzing warfighter capability needs and requirements to identify potential shortfalls and opportunities.</p> <p><b>FY 2020 Plans:</b> Continue to identify and assess enduring and future Air Force capability challenges and opportunities. Continue to develop advanced concept studies and analyses, and derive operational and technology needs required to realize future solutions to warfighter capability needs.</p> <p><b>FY 2021 Plans:</b> Based on the Air Force Warfighting Integration Capability (AFWIC)-developed Air Force Design, continue to assess enduring and future Air Force capability challenges and emerging opportunities that could lead to new warfighting concepts as identified by Air Force cross functional teams. Develop advanced concept studies and analyses, and derive operational and technology needs required to realize future solutions to warfighter capability needs.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 decreased compared to FY 2020 by \$0.711 million. Funding decreased due to civilian pay reprice adjustments.</p>	3.924	4.869	4.158
<p><b>Title:</b> Concept Development</p> <p><b>Description:</b> Conduct concept development activities to inform strategic investment decisions. Formulate and explore multi-domain options (materiel and non-materiel) to better understand operational decision space.</p> <p><b>FY 2020 Plans:</b></p>	3.759	4.665	3.841

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0606017F / <i>Requirements Analysis and Maturation</i>	<b>Project (Number/Name)</b> 666157 / <i>Development Planning</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Continue to formulate and explore multi-domain options (materiel and non-materiel) to better understand operational decision space.</p> <p><b>FY 2021 Plans:</b> Develop advanced concept studies and analyses, and derive operational and technology needs required to realize future solutions to warfighter capability needs.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 decreased compared to FY 2020 by \$0.824 million. Funding decreased due to civilian pay reprice adjustments.</p>			
<p><b>Title:</b> Capability Development Strategies</p> <p><b>Description:</b> Conduct strategic planning activities that address requirements, schedule, cost, technology, and acquisition strategy.</p> <p><b>FY 2020 Plans:</b> Continue to perform pre-systems acquisition planning activities, including concept refinement, cost estimates, acquisition courses of action, and acquisition milestone documentation.</p> <p><b>FY 2021 Plans:</b> Continue to perform pre-systems acquisition planning activities, including concept refinement, cost estimates, acquisition courses of action, and acquisition milestone documentation.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 decreased compared to FY 2020 by \$1.949 million. Funding decreased due to civilian pay reprice adjustments.</p>	2.770	5.999	4.050
<b>Accomplishments/Planned Programs Subtotals</b>	10.453	15.533	12.049

	<b>FY 2019</b>	<b>FY 2020</b>
<p><b>Congressional Add:</b> Program Increase - Nuclear Modernization Analytics</p> <p><b>FY 2019 Accomplishments:</b> Conducted Congressionally-directed efforts</p> <p><b>FY 2020 Plans:</b> Conduct Congressionally-directed efforts</p>	7.772	8.000
<p><b>Congressional Add:</b> Program Increase - Nuclear Deterrence Research</p> <p><b>FY 2019 Accomplishments:</b> Conducted Congressionally-directed efforts</p> <p><b>FY 2020 Plans:</b> Conduct Congressionally-directed efforts</p>	4.857	10.000
<p><b>Congressional Add:</b> Unfunded Requirement - Development Planning</p>	0.000	2.000

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0606017F / <i>Requirements Analysis and Maturation</i>	<b>Project (Number/Name)</b> 666157 / <i>Development Planning</i>
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	FY 2019	FY 2020
<b>FY 2019 Accomplishments:</b> Not Applicable		
<b>FY 2020 Plans:</b> Conduct Congressionally-directed efforts		
<b>Congressional Adds Subtotals</b>	12.629	20.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Not applicable.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0606017F / <i>Requirements Analysis and Maturation</i>				<b>Project (Number/Name)</b> 666158 / <i>INTEGRATED SIMULATION AND ANALYSIS</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
666158: <i>INTEGRATED SIMULATION AND ANALYSIS</i>	-	23.063	51.182	51.332	0.000	51.332	46.005	38.493	27.883	28.396	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Integrated Simulation and Analysis project provides a collaborative cross-organizational, multi-domain, holistic enterprise system-of-systems perspective in synthetic environments for modeling, simulation, analysis, and experimentation of systems and concepts under assessment while enabling exploration of innovative materiel and non-materiel alternatives. This effort accomplishes system performance representations/models, environments, architectures, and tools that underpin variable fidelity; stand-alone, interactive, and distributed simulations; and virtual prototyping using an adaptive ecosystem comprised of organizations and capabilities aligned with purpose. Integrated Simulation and Analysis combines real-time and constructive simulations, operators-in-the-loop, experimental and operational software and hardware engineered in synthesized environments to conduct rapid air, space, cyber, and multi-domain warfighting capabilities assessments in support of development planning, experimentation, developmental and operational testing, and training requirements.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Modeling, Simulation, Analysis, and Experimentation Ecosystem	23.063	17.802	17.349
<b>Description:</b> Develop cross-domain system-of-systems modeling, simulation, and analysis capabilities to support development planning, capabilities assessment, and acquisition decisions.			
<b>FY 2020 Plans:</b> Continue support of integrated simulation capabilities, with models and tools that represent varying battlespace environments. Provide a core set of composable models and a common suite of cross-domain, reusable frameworks at the engineering, engagement, mission, and campaign levels that can be used to support robust development planning and experimentation for high-priority capability gaps, needs, and warfighting challenges identified by Air Force leadership.			
<b>FY 2021 Plans:</b> Continue to reconfigure and mature a modeling, simulation and analysis infrastructure to include models/tool sets, data management/exchange mechanisms, analytic cadre, organizational relationships and analytical methods to provide integrated simulation capabilities with variable levels of fidelity and realistic representation of battlespace environments. Provide a core set of composable models and a common suite of cross-domain, reusable frameworks at the engineering, engagement, mission, campaign, and Air Force enterprise system-of-system levels that can be used to support robust development planning and experimentation for high-priority capability gaps, needs, exploration and warfighting challenges identified by Air Force leadership.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0606017F / <i>Requirements Analysis and Maturation</i>	<b>Project (Number/Name)</b> 666158 / <i>INTEGRATED SIMULATION AND ANALYSIS</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
FY 2021 decreased compared to FY 2020 by \$0.453 million. Funding decreased due to civilian pay reprice adjustments.				
<p><b>Title:</b> Joint Simulation Environment (JSE)</p> <p><b>Description:</b> Develops a government-owned and operated modeling and simulation capability that enables multi-platform, multi-domain integration and interoperability. This capability is required to support developmental and operational testing, tactics development, and advanced training for 5th-generation platforms and other future capabilities, critical for force development.</p> <p><b>FY 2020 Plans:</b> Design, develop, prototype, and integrate critical JSE components to establish a performance baseline encompassing Air Force requirements linking 4th-, 5th-, and 6th-generation systems into a robust environment suitable for test, advanced training, and experimentation.</p> <p><b>FY 2021 Plans:</b> Continue prototyping and integrate critical JSE components into the baseline encompassing Air Force requirements linking 4th-, 5th-, and 6th-generation systems into a robust environment suitable for test, advanced training, and experimentation. Integrate additional modeling capabilities for electronic warfare, weapons, and space into the baseline to enable integrated testing in a simulated environment.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 increased compared to FY 2020 by \$4.603 million. Funding increased due to the integration of additional modeling capabilities.</p>		0.000	25.880	30.483
<p><b>Title:</b> Simulation and Analysis Facility Support</p> <p><b>Description:</b> Develops real-time, high-fidelity, live-virtual-constructive modeling, simulation, and analysis capability to evaluate network-enabled warfighting capabilities, strategies, concepts of operation, tactics, emerging technologies, and human system interfaces to support and enable acquisition, test, and training.</p> <p><b>FY 2020 Plans:</b> Develop and update integrated processes, tools, simulation environments, and capabilities to support live-virtual-constructive modeling, simulation, and analysis with a focus on cross-domain and multi-level security infrastructures as multi-domain operations force multipliers to support analysis, assessment, and experimentation, as well as operational test and training infrastructures.</p> <p><b>FY 2021 Plans:</b> Continue to develop upgrades and integrated processes, tools, simulation environments, and capabilities to support live-virtual-constructive modeling, simulation, and analysis with a focus on cross-domain and multi-level security infrastructures as multi-</p>		0.000	3.500	3.500

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0606017F / <i>Requirements Analysis and Maturation</i>	<b>Project (Number/Name)</b> 666158 / <i>INTEGRATED SIMULATION AND ANALYSIS</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
domain operations force multipliers to support analysis, assessment, and experimentation, as well as operational test and training infrastructures.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Not applicable.			
<b>Accomplishments/Planned Programs Subtotals</b>	23.063	47.182	51.332

	FY 2019	FY 2020
<b><i>Congressional Add:</i></b> Unfunded Requirement - Integrated Simulation and Analysis	0.000	4.000
<b><i>FY 2019 Accomplishments:</i></b> Not applicable		
<b><i>FY 2020 Plans:</i></b> Conduct Congressionally-directed efforts		
<b>Congressional Adds Subtotals</b>	0.000	4.000

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

Not applicable.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0606398F / <i>Management HQ - T&amp;E</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	5.013	5.785	0.000	5.785	5.766	5.795	5.915	6.039	0.000	34.313
6606TS: <i>Test and Evaluation Support</i>	-	0.000	5.013	5.785	0.000	5.785	5.766	5.795	5.915	6.039	0.000	34.313
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

This program element includes Air Force Flight Test Center management headquarters personnel to lead, guide and direct the operation of the Air Force Test Center (AFTC) test activities which are included in the Department of Defense (DoD) Major Range and Test Facility Base (MRTFB).

Test and Evaluation (T&E) Support funds institutional test infrastructure activities including: Command and supervisory staffs; supply stocks; maintenance, repair, and replacement of worn or obsolete test equipment and facilities; test infrastructure for data collection, transmission, reduction, and analysis; civilian salaries; temporary duty travel; range operations and material support contract costs for hardware and software engineering and maintenance; and minor improvement and modernization projects. It also funds institutional test aircraft depot level maintenance such as: Programmed Depot Maintenance (PDM), the calendar-based cyclic scheduling of aircraft into depots for update/inspection; modifications and any other depot level repairs required by the aircraft System Program Directors (SPD); engine overhauls; depotprovided area assistance; and assorted ground support equipment overhauls.

This program was previously in PE 0605898F.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force				<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0606398F / <i>Management HQ - T&amp;E</i>				
<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	
Previous President's Budget	0.000	5.013	5.338	0.000	5.338	
Current President's Budget	0.000	5.013	5.785	0.000	5.785	
Total Adjustments	0.000	0.000	0.447	0.000	0.447	
• Congressional General Reductions	0.000	0.000				
• Congressional Directed Reductions	0.000	0.000				
• Congressional Rescissions	0.000	0.000				
• Congressional Adds	0.000	0.000				
• Congressional Directed Transfers	0.000	0.000				
• Reprogrammings	0.000	0.000				
• SBIR/STTR Transfer	0.000	0.000				
• Other Adjustments	0.000	0.000	0.447	0.000	0.447	
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>				<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Test and Evaluation Support				0.000	5.013	5.785
<b>Description:</b> Air Force Flight Test Center management headquarters personnel						
<b>FY 2020 Plans:</b> Air Force Flight Test Center management headquarters personnel						
<b>FY 2021 Plans:</b> Air Force Flight Test Center management headquarters personnel						
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Air Force Flight Test Center management headquarters personnel						
<b>Accomplishments/Planned Programs Subtotals</b>				0.000	5.013	5.785
<b>D. Other Program Funding Summary (\$ in Millions)</b> N/A						
<b>Remarks</b>						
<b>E. Acquisition Strategy</b> N/A						

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303255F <i>I Command, Control, Communication, and Computers (C4) - STRATCOM</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	24.564	0.000	24.564	24.717	12.766	13.003	13.125	Continuing	Continuing
664620: <i>NC3 Enterprise Center</i>	-	0.000	0.000	24.564	0.000	24.564	24.717	12.766	13.003	13.125	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
 This program, BA 6, PE 0303255F, project 664620, NC3 Systems Engineering and Assessments, is a new start.  
 This program, BA 6, PE 0303255F, project 664620, Modeling and Simulation and Enterprise Data Environment Development, is a new start.

In FY21, PE 0303131K, Strategic C3 Support (T70) efforts were transferred from Defense Information Systems Agency (DISA) to PE 0303255F, Command, Control, Communication, and Computers (C4), Project 664620, NC3 Enterprise Center, in order to realign funding in accordance with SecDef approved NC3 governance improvement plan.

**A. Mission Description and Budget Item Justification**

The NC3 Enterprise Center (NEC) was established to oversee the NC3 Enterprise and associated modernization efforts. Tasked by the Secretary of Defense, the NEC will oversee and monitor operations and security of the enterprise and develop tools to assist in monitoring the readiness of the NC3 architecture and capture the operational risks as adversaries develop the ability to disrupt our capabilities from multiple threat vectors. This effort will fund systems engineering and assessment activities previously accomplished by DISA in support of the NC3 Enterprise.

The NEC will capture and integrate process and system data to assess operational risk, characterize multi-domain threats, and explore operational trade space associated with next generation NC3 architectures. The NEC will work with the services to explore new technologies and develop innovative solutions in a virtual environment, and capture metrics that identify system problems and readiness issues before they impact operations. The NEC will also develop digital engineering capabilities to help support governance responsibilities of NC3.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver NC3 enterprise capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303255F / <i>Command, Control, Communication, and Computers (C4) - STRATCOM</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	24.564	0.000	24.564
Total Adjustments	0.000	0.000	24.564	0.000	24.564
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	24.564	0.000	24.564

**Change Summary Explanation**

FY2021 - this is a new effort in FY21.

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<b>Title:</b> NC3 Systems Engineering and Assessments	-	0.000	12.133	0.000	12.133
<b>Description:</b> Maintain NC3 Systems Engineering and Assessment Capability					
<b>FY 2020 Plans:</b> N/A; FY20 work executed from DISA PE 0303131K					
<b>FY 2021 Base Plans:</b>					
- Continue oversight and configuration control of the NLCC functional baseline					
- Continue to identify NLCC capability gaps					
- Develop engineering courses of action to close those gaps					
- Continue to recommend plans for future NLCC capabilities					
- Perform end-to-end testing of fielded capabilities					
- Perform operational assessments of current capabilities to provide quantitative measures of ongoing system performance and operational efficiency					
- Continue to develop the NLCC Reference Architecture, its associated NLCC Roadmap, and the technical architecture patterns that will guide future solution architecture development					

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support	<b>R-1 Program Element (Number/Name)</b> PE 0303255F I Command, Control, Communication, and Computers (C4) - STRATCOM
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**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Demonstrate ability to capture the communication flows in the NC3 system and allow data engineers the ability to identify and work through ideas to improve the reliability and availability of NC3.  <b>FY 2021 OCO Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY20 work executed from DISA PE 0303131K					
<b>Title:</b> Modeling and Simulation and Enterprise Data Environment Development  <b>Description:</b> Develop or modify modeling and simulation capability and field the NC3 Enterprise Data Environment  <b>FY 2020 Plans:</b> N/A  <b>FY 2021 Base Plans:</b> - Purchase hardware and software to establish the Enterprise Data Environment - Work with the services to modify or develop models or simulations that allow the ability to evaluation NC3 elements' performance, especially with respect to threats - Work with the services to configure and connect models and simulations to allow a seamless environment within which the data analysts will work to clean the data, manage it, and provide visualizations. - Demonstrate the initial mission thread, force direction messages between the airborne command nodes and the submarines - Expand Global Data Integration exposure to Missile Warning and Missile Defense Programs of Record providing and improved operational picture to address SECDEF tasking - Work with the services to add models/simulations that demonstrate a sensor-to-shooter analytical capability  <b>FY 2021 OCO Plans:</b> N/A  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY21 New Start	-	0.000	12.431	0.000	12.431
<b>Accomplishments/Planned Programs Subtotals</b>	-	0.000	24.564	0.000	24.564

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303255F <i>I Command, Control, Communication, and Computers (C4) - STRATCOM</i>
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**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

The Digital Engineering effort is led by the NC3 Enterprise Center under USSTRATCOM and will utilize existing contracts to purchase equipment and software, in particular, requesting and funding additional capability development from on-going Service software efforts to model NC3 activities.



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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0308602F / <i>ENTEPRISE INFORMATION SERVICES (EIS)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	17.258	10.628	9.883	0.000	9.883	8.851	9.091	8.484	8.717	Continuing	Continuing
66ACS1: <i>ACQ and Command Support Integration</i>	-	17.258	10.628	9.883	0.000	9.883	8.851	9.091	8.484	8.717	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Enterprise Information Services (EIS) is a portfolio of integrated programs/technologies/services that enables and sustains Air Force Information Management and Knowledge Operations. EIS provides Air Force personnel access to, and management of, timely, accurate, and trusted mission data, information, and knowledge supporting information/decision superiority. EIS utilizes the services provided by Cloud One and Enterprise Resource Planning Common Services (ERP CS)—together, previously known as the Common Computing Environment (CCE).

Cloud One and ERP CS provide common platforms, common application support services, data center migration strategy, and security services for hosting AF mission applications. Cloud One provides AF target environments and cloud migration services for AF mission applications and ERP CS provides the AF target environments for AF ERP mission applications. This acquisition is critical for multiple hosting environments leveraging DoD Joint Information Environment (JIE) Core Data Centers (CDC), commercial cloud capabilities and DISA brokered cloud capabilities in compliance with the Air Force Information Technology (AF IT) baselines. This effort also provides technical expertise, programmatic guidance, and policy navigation that supports AF approved application rationalization processes to multiple hosting environments and enterprise IT Lifecycle Capabilities Integration Environment (CIE) testing of services.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver EIS capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support	<b>R-1 Program Element (Number/Name)</b> PE 0308602F I ENTEPRISE INFORMATION SERVICES (EIS)
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	20.435	17.128	9.700	0.000	9.700
Current President's Budget	17.258	10.628	9.883	0.000	9.883
Total Adjustments	-3.177	-6.500	0.183	0.000	0.183
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-6.500			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-2.500	0.000			
• SBIR/STTR Transfer	-0.696	0.000			
• Other Adjustments	0.019	0.000	0.183	0.000	0.183

**Change Summary Explanation**

FY19 Above Threshold Reprogramming (ATR) of -\$2.5M accomplished toward DoD Commission on AI. FY20 Congressional Mark of -\$6.5M cited "Improving funds management: Forward financed."

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Platform Provisioning</p> <p><b>Description:</b> This task provides the engineering analysis of the Target Baseline platform configurations leading to development of design patterns and templates to be used at the enterprise level by Air Force Information Technology capabilities. These standards will be developed against multiple hosting environments to include DISA MilCloud, commercial cloud, and Installation Processing Nodes.</p> <p><b>FY 2020 Plans:</b> - Continue development of common platforms and services, compliance across environments and engineering analysis.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	0.240	0.000	0.000
<p><b>Title:</b> Managed Service Office (MSO)</p>	0.114	0.000	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0308602F / <i>ENTEPRISE INFORMATION SERVICES (EIS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> This task develops the process flows for engaging mission application program offices, gathering infrastructure requirements and performing engineering analysis to determine optimum hosting platforms for Air Force IT capabilities. This provides the foundation for initial capabilities supporting the JIE stand-up.</p> <p><b>FY 2020 Plans:</b> - Continue engineering analysis efforts to support application compliance with Federal Data Center Consolidation Initiative (FDCCI) mandates.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>				
<p><b>Title:</b> Enterprise Services Extended to the Commercial Cloud</p> <p><b>Description:</b> This effort develops the design patterns and templates for taking the standardized platforms and enterprise application support services to commercial cloud environments. As more commercial cloud environments receive certifications for hosting DoD applications, this ensures the proper tools are developed and integrated for use in the commercial cloud environments.</p> <p><b>FY 2020 Plans:</b> - Continue to provide application engineering analyses, engagement process and develop automated platform tools.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>		0.356	0.000	0.000
<p><b>Title:</b> Common Tool Development</p> <p><b>Description:</b> Develop and deploy a common set of enterprise tools to support application development and testing. These tools allow the common computing environment to provide Test as a Service to mission application development teams; allowing for standardize development and test environments.</p> <p><b>FY 2020 Plans:</b></p>		0.135	0.000	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 0308602F / <i>ENTEPRISE INFORMATION SERVICES (EIS)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
- Continue engineering and analysis activities to develop and incorporate common test processes.				
<b>FY 2021 Plans:</b> N/A				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A				
<b>Title:</b> Enterprise Resource Planning Consolidation		16.413	10.628	9.883
<b>Description:</b> Design, develop and deliver consolidated common services for ERP applications. Target environments are development, test, production and disaster recovery across at least two geographically separated locations. This effort includes completing cybersecurity requirements and acquisition of supporting hardware, software and management resources.				
<b>FY 2020 Plans:</b> - Complete and deploy development, test, production and disaster recovery environments. - Continue cybersecurity requirements and independent testing of services to be deployed for development/test environments and continue production/disaster recovery environments. - Lease supporting hardware and purchase annual software. - Develop architecture for transitioning to future cloud environment.				
<b>FY 2021 Plans:</b> - Will continue to build out architecture design for moving AF ERPs to a cloud environment. - Will determine baseline and plan for refactoring ERPs to move to a IaaS and SaaS cloud environment. - Will develop a plan alongside ERPs to promote standardization and chart a path to use out-of-the-box software solutions.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> - Funding decreased from FY 2020 to FY 2021 due to higher Air Force priorities.				
<b>Accomplishments/Planned Programs Subtotals</b>		17.258	10.628	9.883
<b>D. Other Program Funding Summary (\$ in Millions)</b> N/A				
<b>Remarks</b>				
<b>E. Acquisition Strategy</b> N/A				

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>					<b>R-1 Program Element (Number/Name)</b> PE 0702806F / <i>Acquisition and Management Support</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	12.130	5.913	13.384	0.000	13.384	17.174	16.000	16.731	9.985	0.000	91.317
66ACSI: <i>ACQ and Command Support Integration</i>	-	12.130	5.913	13.384	0.000	13.384	17.174	16.000	16.731	9.985	0.000	91.317

**A. Mission Description and Budget Item Justification**

The program funds efforts to meet the Defense Acquisition Workforce Improvement Act (DAWIA), as well as Congressional, SECDEF, and SECAF mandates to provide program management execution tools, systems integration and architectural analysis, information technology infrastructure development, and technical workforce management. Funding also provides the framework for Air Force business and acquisition transformation in developing capabilities-based architectures, re-engineering and enabling technologies, integrating robust systems engineering into early acquisition processes, acquisition process improvement analysis, and developing and managing a technical workforce with the expertise to uniformly implement OSD and Air Force engineering guidance and policies. These efforts provide stability in Air Force Acquisition by integrating major processes to reverse trends toward unpredictable program cost, schedule, and performance to facilitate quick response to urgent operational needs from across the entire spectrum of potential conflicts. These integrated capabilities will provide OSD and AF acquisition leadership insights needed to effectively manage a complex portfolio of acquisition programs through more timely and reliable access to authoritative acquisition data.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	12.367	5.913	13.883	0.000	13.883
Current President's Budget	12.130	5.913	13.384	0.000	13.384
Total Adjustments	-0.237	0.000	-0.499	0.000	-0.499
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.237	0.000			
• Other Adjustments	0.000	0.000	-0.499	0.000	-0.499

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6					<b>R-1 Program Element (Number/Name)</b> PE 0702806F / <i>Acquisition and Management Support</i>				<b>Project (Number/Name)</b> 66ACSI / <i>ACQ and Command Support Integration</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
66ACSI: <i>ACQ and Command Support Integration</i>	-	12.130	5.913	13.384	0.000	13.384	17.174	16.000	16.731	9.985	0.000	91.317
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY18, Project 66ACSI, Civilian Pay, was transferred to PE 0605829F Acquisition Workforce - Cyber, Network, and Business Systems.

**A. Mission Description and Budget Item Justification**

The program funds efforts to meet the Defense Acquisition Workforce Improvement Act (DAWIA), as well as Congressional, SECDEF, and SECAF mandates to provide program management execution tools, systems integration and architectural analysis, information technology infrastructure development, and technical workforce management. Funding also provides the framework for Air Force business and acquisition transformation in developing capabilities-based architectures, re-engineering and enabling technologies, integrating robust systems engineering into early acquisition processes, acquisition process improvement analysis, and developing and managing a technical workforce with the expertise to uniformly implement OSD and Air Force engineering guidance and policies. These efforts provide stability in Air Force Acquisition by integrating major processes to reverse trends toward unpredictable program cost, schedule, and performance to facilitate quick response to urgent operational needs from across the entire spectrum of potential conflicts. These integrated capabilities will provide OSD and AF acquisition leadership insights needed to effectively manage a complex portfolio of acquisition programs through more timely and reliable access to authoritative acquisition data.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Acquisition Mandates	0.534	0.649	2.782
<b>Description:</b> Supporting Congressional, SECDEF, and SECAF mandates. Program funding provides the framework for Air Force business and acquisition.			
<b>FY 2020 Plans:</b> Continue program management and resources management oversight.			
<b>FY 2021 Plans:</b> Continue program management and resources management oversight.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increased to continue program management and resources management oversight.			
<b>Title:</b> Performance Measurements	0.533	0.000	0.000
<b>Description:</b> Develops and upgrades performance measures for capability-based planning constructs.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0702806F / <i>Acquisition and Management Support</i>	<b>Project (Number/Name)</b> 66ACSI / <i>ACQ and Command Support Integration</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>FY 2020 Plans:</b> Funding not required.				
<b>FY 2021 Plans:</b> Funding is not required in FY21				
<b>Title:</b> Technical and Analytical Support		1.918	0.100	2.009
<b>Description:</b> Supports Acquisition Domain-level effort to integrate existing acquisition business systems/services, data, and processes supporting key Acquisition capabilities at the enterprise level (via the Acquisition Domain Capabilities Integration (ADCI) activities). This support entails analysis required to architect an integrated environment on multiple hosting platforms to support the portfolio of acquisition business systems by solving problems across/outside of individual system boundaries with the goal of reducing redundancy, improving systems operations, and improving management of data resulting in dramatically improved transparency, efficiency, and effective management of the Acquisition process. This support also helps implement standards for data management and service-oriented design methodology to facilitate efficiency and interoperability as well as providing some business intelligence services. The creation and support of domain-level requirements and governance processes as well as the creation of domain-wide data standards are additional support items provided. In addition, includes support for Artificial Intelligence/Machine Learning (AI/ML) pilots, experimentation associated with business analytics, acquisition program performance measures, and predictive analytics in support of decision-making and workforce training for the acquisition enterprise.				
<b>FY 2020 Plans:</b> Continuation of work supporting the automation of key Life Cycle Management Center (LCMC) and Space & Missile Systems Center (SMC) acquisition processes. Continuation of work supporting the onboarding of new capabilities across the Acquisition Domain.				
<b>FY 2021 Plans:</b> Continuation of work supporting the automation of key Life Cycle Management Center (LCMC) and Space & Missile Systems Center (SMC) acquisition processes and onboarding of new capabilities across the Acquisition Domain. Supports refinement of CIO portfolio Artificial Intelligence (AI)/Machine Learning (ML) vision and incorporating functionalities built as part of AI/ML pilots, experimentation associated with business analytics, acquisition program performance measures, and predictive analytics in support of decision-making and workforce training for the acquisition enterprise.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase to cover acquisition processes and new capabilities.				
<b>Title:</b> Associated Tool Development		4.319	0.695	0.746

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0702806F / <i>Acquisition and Management Support</i>	<b>Project (Number/Name)</b> 66ACSI / <i>ACQ and Command Support Integration</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> Upgrade the enterprise tools that assist PMs and acquisition professionals with the day-to-day program management tasks throughout an Acquisition program's lifecycle.</p> <p><b>FY 2020 Plans:</b> Complete migration to a cloud hosting environment. Continue expansion of the integrated IT operational environment (Acquisition Application Store) to include additional Acquisition Program Office automation and additional application development. Continue assessment of appropriate tools.</p> <p><b>FY 2021 Plans:</b> Continue expansion of the integrated IT operational environment (Acquisition Application Store) to include additional Acquisition Program Office automation and additional application development. Continue assessment of appropriate tools.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase for application development and expansion of integrated IT operational environment.</p>				
<p><b>Title:</b> Project Management Resource Tools (PMRT)</p> <p><b>Description:</b> Upgrade enterprise PMRT tools that provide program/project resource management support to the Acquisition community.</p> <p><b>FY 2020 Plans:</b> Continued enhancement of PMRT to allow increased visibility to acquisition programmatic and financial information for all AF Acquisition Investment programs. Continued expansion of critical PMRT interfaces via the Acquisition Data Service Broker (ADSB). Development of additional PMRT acquisition dashboard data visualizations.</p> <p><b>FY 2021 Plans:</b> Continued enhancement of PMRT to allow increased visibility to acquisition programmatic and financial information for all AF Acquisition investment programs. Continued expansion of critical PMRT interfaces via Acquisition Data Service Broker (ADSB) and enhance PMRT native apps. Increase PMRT refactoring and migration to the Cloud for the incorporation of Artificial Intelligence (AI), Machine Learning (ML), and Predictive Analysis.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased to fund refactoring and migration of PMRT to the Cloud and to enhance capabilities of PMRT native apps.</p>		2.446	2.173	5.646
<p><b>Title:</b> Capabilities Integration Environment (CIE)</p> <p><b>Description:</b> CIE is an Infrastructure as a Service (IaaS) provider that enables application proofs-of-concept, development, integration, and test activities in accredited on-premises government cloud and third-party commercial cloud environments.</p>		2.117	2.096	2.001



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600 / 6	<b>R-1 Program Element (Number/Name)</b> PE 0702806F / <i>Acquisition and Management Support</i>	<b>Project (Number/Name)</b> 66ACSI / <i>ACQ and Command Support Integration</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b><i>FY 2020 Plans:</i></b> Continues a secure, scalable environment to support Research and Development (R&amp;D), Development Test/Operational Test (DT/OT), integration, exercises, experimentation, acquisition development and direct Warfighter support.</p> <p><b><i>FY 2021 Plans:</i></b> Continue support for secure, scalable environment for R&amp;D, DT/OT, integration, exercises, experimentation, acquisition development and direct Warfighter support.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Decrease reprioritization of requirements.</p>				
<p><b><i>Title:</i></b> Development and Retention</p> <p><b><i>Description:</i></b> Supports activities to develop, manage and retain the acquisition workforce.</p> <p><b><i>FY 2020 Plans:</i></b> Performs activities to develop, manage, and retain the acquisition workforce by providing training on enhanced business and engineering processes that enable the effective management of complex acquisition processes, and allows continued interface with the academic community.</p> <p><b><i>FY 2021 Plans:</i></b> Continue to perform activities to develop, manage, and retain the acquisition workforce by providing training on enhanced business and engineering processes.</p>		0.263	0.200	0.200
<b>Accomplishments/Planned Programs Subtotals</b>		12.130	5.913	13.384
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0804731F / <i>General Skill Training</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.432	6.475	1.262	0.000	1.262	1.529	1.557	1.584	1.613	Continuing	Continuing
665297: <i>Technical Training Information Systems</i>	-	0.432	6.475	1.262	0.000	1.262	1.529	1.557	1.584	1.613	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

TECHNICAL TRAINING MANAGEMENT SYSTEM (TTMS): TTMS provides AETC organizations with a world class commercial-off-the-shelf (COTS) / government-off-the-shelf (GOTS) learning management system which supports six functions: course design and development; student evaluation; instructor management; student management; data analysis; and resource administration. TTMS is a centralized web-based system which provides productivity enhancements and higher degree of efficiency to AETC. The primary requirement objectives currently under development are: 1) Integration of Basic Training Management System (BTMS) capabilities and student records into the TTMS.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.448	1.475	1.500	0.000	1.500
Current President's Budget	0.432	6.475	1.262	0.000	1.262
Total Adjustments	-0.016	5.000	-0.238	0.000	-0.238
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.016	0.000			
• Other Adjustments	0.000	0.000	-0.238	0.000	-0.238

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 665297: *Technical Training Information Systems*

Congressional Add: *Technical Training Management System (TTMS)*

FY 2019	FY 2020
0.000	5.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 0804731F / <i>General Skill Training</i>
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<b>Congressional Add Details (\$ in Millions, and Includes General Reductions)</b>	<b>FY 2019</b>	<b>FY 2020</b>
Congressional Add Subtotals for Project: 665297	0.000	5.000
Congressional Add Totals for all Projects	0.000	5.000

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Technical Training Management System (TTMS) <b>Description:</b> Provided TTMS productivity enhancements and higher degree of efficiency to AETC (i.e., Military Training Leader and Basic Training Management System).  <b>FY 2020 Plans:</b> developed TTMS  <b>FY 2021 Plans:</b> continue TTMS development  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Additional effort to support TTMS	0.432	1.475	1.262
<b>Accomplishments/Planned Programs Subtotals</b>	0.432	1.475	1.262

	<b>FY 2019</b>	<b>FY 2020</b>
<b>Congressional Add:</b> Technical Training Management System (TTMS)	0.000	5.000
<b>FY 2019 Accomplishments:</b> NA		
<b>FY 2020 Plans:</b> developed TTMS		
<b>Congressional Adds Subtotals</b>	0.000	5.000

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

Not applicable

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1001004F / <i>International Activities</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	3.866	4.071	3.599	0.000	3.599	4.221	4.298	4.376	4.456	Continuing	Continuing
664645: <i>International Cooperative Research &amp; Development</i>	-	3.866	4.071	3.599	0.000	3.599	4.221	4.298	4.376	4.456	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The mission of this program is to establish, sustain, expand, and enhance mutually beneficial international partnerships through the implementation of air, space, and cyber international armament cooperation (IAC) agreements thereby supporting USAF and DoD goals and objectives. These International Agreements (IAs) will: significantly improve US and allied conventional defense capacity and capabilities; accelerate the availability of defense systems; realize solutions to meet capability gaps; acquire, upgrade, sustain, and/or support common or interoperable equipment with our allies; create cooperative acquisition, production, or logistic partnerships; promote mutual and equitable sharing of effort, cost, information, and risk; provide access to remote or operational test sites; leverage economies of scale; and promote interoperability and commonality with our allies.

The USAF is party to numerous (+500) air, space, and cyber bilateral and multilateral IAs to solve common US and allied military capability gaps, develop materiel solutions, harmonize requirements, and build interoperability with our international partners. This program element funds the USAF to identify, develop, process, negotiate, conclude, implement, and manage IAs in compliance with statutory provisions, legal authorities, fiscal constraints, technology transfer controls, intellectual property rights, third party transfer provisions, equitability criteria, industrial base factors, political-military interests, and the National Defense Strategy (NDS). Included in this budget are: air, space, and cyber IAC IAs activities; technology assessments; specialized working groups; Air Senior National Representative (ASNR) activities; IAC program and project reviews; bilateral and multilateral staff talks; Engineering and Scientist Exchange Program (ESEP); and Administrative and Professional Exchange Program (APEP).

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1001004F / <i>International Activities</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	3.998	4.071	4.142	0.000	4.142
Current President's Budget	3.866	4.071	3.599	0.000	3.599
Total Adjustments	-0.132	0.000	-0.543	0.000	-0.543
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.132	0.000	-0.543	0.000	-0.543

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
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<p><b>Title:</b> International Partnership Activities</p> <p><b>Description:</b> Funds USAF management, support, and oversight of IAC goals and objectives to build global partnerships in support of national security objectives and the National Defense Strategy (NDS). Funds USAF participation in NATO forums to promote harmonization and interoperability. Funds USAF support and participation in OSD bi-lateral IAC forums. Funds SAF/IA Australian liaison office. Funds technical assessments and discussions that support technology development activities and interoperability. Funds USAF efforts to enhance existing relationships with: Australia, Belgium, Canada, Denmark, France, Germany, Israel, Italy, Japan, NATO, Netherlands, New Zealand, Norway, South Korea, Singapore, Spain, Sweden, and UK. Funds USAF efforts to strengthen/build IAC relationships with: Czech Republic, Estonia, Finland, Hungary, India, Luxembourg, Poland, and Turkey. Funds USAF efforts to establish IAC relationships with: Brazil, Chile, Columbia, Peru, South Africa, Taiwan, and other emerging partners IAW the NDS.</p> <p><b>FY 2020 Plans:</b> Continue ongoing management, support, and oversight of IAC goals and objectives to establish, sustain, expand and enhance mutually beneficial partnerships between the US and coalition partners to meet current and emerging global strategic challenges through optimization of interoperability, integration, and interdependence between coalition forces. Continuing efforts will have an enhanced focus on mutually beneficial partnerships IAW the NDS.</p> <p><b>FY 2021 Plans:</b> Continue ongoing management, support, and oversight of IAC goals and objectives to establish, sustain, expand and enhance mutually beneficial partnerships between the US and coalition partners to meet current and emerging global strategic challenges</p>	1.738	1.821	1.278
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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 1001004F <i>I International Activities</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
through optimization of interoperability, integration, and interdependence between coalition forces. Continuing efforts will have an enhanced focus on mutually beneficial partnerships IAW the NDS.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease of \$.543M is due to adjustments made within the USAF budget, the decrease will require re-alignment of priorities to International Activities Partnerships.				
<b>Title:</b> International Armaments Cooperation (IAC) Agreement Activities  <b>Description:</b> Funds the USAF's ability to identify, develop, process, negotiate, conclude, implement, and manage an increasing number of research, development, test, and evaluation (RDT&E) bilateral and multilateral IAC Agreements that meet the goals, objectives, and mission of the USAF and DoD. IAC activities provide the USAF access to: critical geography; remote test ranges; challenged environments; operational environments; threat scenarios; new capabilities; world class R&D facilities; personnel; cost sharing; economies of scale; critical information systems; and launch vehicles. IAC activities will meet warfighter needs and enhance interoperability by cooperating with our partners in the areas of: secure communications, positioning/navigation, situational awareness, materials and composites, human effectiveness, space domain awareness, robotics, nanotechnology, missile warning, position, navigation and timing (PNT), satellite communications, coalition information sharing, biometrics, munitions design, hypersonics, alternative energy, improvised explosive devices (IED) defeat, weapons of mass destruction (WMD) defeat, responsive space, ground and space based radars, sensors, autonomous control, distributed missions, training systems, lasers, weapon systems, weapon delivery, remotely piloted aircraft, armaments interface, intelligence, surveillance and reconnaissance (ISR), sustainment, gap analysis, simulators, combined logistics, software updates, mission planning systems, world-wide flight requirements, electronic warfare, safety, aging aircraft, airlift, tankers, trainers, system modifications, directed energy, weapon stores, acquisition, development, co-production, interoperability, maintenance, system development, and upgrades.  <b>FY 2020 Plans:</b> Continue to identify, develop, process, negotiate, conclude, implement, and manage the increasing number of RDT&E bilateral and multilateral IAs that meet the goals, objectives, and mission of the USAF and DoD in the Air Domain. Negotiations will continue on IAs not concluded during FY19. New Air Domain agreements and amendments will be initiated IAW the NDS.  <b>FY 2021 Plans:</b> Continue to identify, develop, process, negotiate, conclude, implement, and manage the increasing number of RDT&E bilateral and multilateral IAs that meet the goals, objectives, and mission of the USAF and DoD in the Air Domain. Negotiations will continue on IAs not concluded during FY20. New Air Domain agreements and amendments will be initiated IAW the NDS.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>		1.678	1.800	1.871

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1001004F / <i>International Activities</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Decrease of \$.271M is due to adjustments made within the USAF budget, the decrease will require re-alignment of priorities to International Activities Partnerships.			
<b>Title:</b> Engineer and Scientist Exchange Program/Administrative and Professional Exchange Program (ESEP/APEP) <b>Description:</b> Funds the USAF execution and management oversight of ESEP and APEP programs and personnel. Funds eight to ten field level military and civilian personnel from Air Force Materiel Command Facilities, Product Centers, Test Centers, and Logistic Centers for tours at selected allied partner government laboratories and facilities.  <b>FY 2020 Plans:</b> Continue USAF execution and management oversight of the ESEP and APEP programs and personnel.  <b>FY 2021 Plans:</b> Continue USAF execution and management oversight of the ESEP and APEP programs and personnel.	0.300	0.300	0.300
<b>Title:</b> Air Force Materiel Command (AFMC) <b>Description:</b> Funds AFMC's ability to support IAC RDT&E activities which directly promotes international collaboration. Funds field level technical assessments and discussions that support technology identification and initial development activities in support of interoperability.  <b>FY 2020 Plans:</b> Continue support of AFMC's ability to identify, assess, continue RDT&E activities from 2019 and pursue new areas of cooperation which support interoperability and relationship building efforts with our international partners.  <b>FY 2021 Plans:</b> Continue support of AFMC's ability to identify, assess, continue RDT&E activities from 2020 and pursue new areas of cooperation which support interoperability and relationship building efforts with our international partners.	0.150	0.150	0.150
<b>Accomplishments/Planned Programs Subtotals</b>	3.866	4.071	3.599

**D. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 06 1001004F: <i>International Activities</i>	0.000	0.000	-	-	-	-	-	-	-	0.000	0.000

**Remarks**  
 There is no other program funding for the activities pursued under 1001004F International Activities.



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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

**Appropriation/Budget Activity**  
3600: *Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support*

**R-1 Program Element (Number/Name)**  
PE 1001004F / *International Activities*

**E. Acquisition Strategy**

This program element is the only source of USAF funds to identify, develop, process, negotiate, conclude, implement, and manage IAC opportunities to: (a) acquire, develop, upgrade, sustain, and support common or interoperable equipment with our allies; (b) leverage USAF resources through cost sharing and economies of scale with our partners; (c) exploit the best US and allied technologies for equipping coalition forces; and (d) foster interoperability and commonality with our allies. We obtain these benefits only after IAC opportunities are identified, explored, assessed, developed and IAs are negotiated and concluded. This PE provides funds to execute up-front IAC responsibilities, realize cooperative opportunities, assess allied technologies and generate sound, cost-effective cooperative programs between the USAF and our international partners in the areas of Air, Space and Cyberspace. Once IAs are concluded they are transferred to the appropriate technology or system program office and are then funded by the program office.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>					<b>R-1 Program Element (Number/Name)</b> PE 1206116F / <i>Space Test and Training Range Development</i>							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	22.408	14.942	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
666156: <i>Space Test and Training Range Development</i>	-	22.408	14.942	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206116F, Space Test and Training Range Development efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206116SF Space Test and Training Range Development from Appropriation 3600, Budget Activity 06 due to the creation of a new Appropriation for Space Force.

Supports the development of Space Test and Training Range (STTR) capabilities critical for developmental and operational test, training, exercises and tactics development for Space Control systems and Joint National Space Architecture. Includes development, demonstration and delivery of test assets, special test equipment, capabilities and systems required to test, validate, and verify performance of integrated space control systems. Provides a safe, secure, controllable and repeatable environment for the testing of space control mission systems and training operators that in realistic and relevant environments. Additionally, using an agile incremental development approach for range capabilities, this program develops test range assets for both the fixed node Space Range Operation Center (SROC) at Schriever AFB and a deployable Signal Monitoring Unit capability to support complex Joint and AF exercises. The virtual range as part of the Family of Systems (FoS), called Advanced Threat Simulation Environment (ATSE) virtual range, is being developed to accomplish the STTR mission. ATSE integrates to a Distributed Mission Architecture, tying into cyber, air, and space ranges for increased realism and complexity required to prepare space operators for real-world threats. This technology will allow for the first-ever use of a realistic signal environment to increase the realism and efficiency of space control squadron training. Additionally, the STTR Next Space Orbital Engagement (OE) range risk reduction projects will analyze, prototype, and demonstrate potential range systems that is used to support the testing and training of new advanced development space systems, advanced training for space operator orbital engagement maneuvers advanced, and future exercises. These risk reduction activities will include on-orbit capabilities, ground components, communication between nodes, and other required infrastructure.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver STTR weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206116F / <i>Space Test and Training Range Development</i>
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This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	23.157	19.942	20.288	0.000	20.288
Current President's Budget	22.408	14.942	0.000	0.000	0.000
Total Adjustments	-0.749	-5.000	-20.288	0.000	-20.288
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-5.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.749	0.000			
• Other Adjustments	0.000	0.000	-20.288	0.000	-20.288

**Change Summary Explanation**

FY 2020: funding request was reduced by \$5.000 million to account for the availability of prior year execution balances.  
 FY 2021: \$20.288M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Range Control</p> <p><b>Description:</b> Development and acquisition of mobile, transportable, virtual, on-orbit, and fixed range monitoring, emulation, and communications capabilities for the space range.</p> <p><b>FY 2020 Plans:</b>                      Continue development of virtual range integration with cyber and air ranges hosting precision emulators and other environments allowing tactics, techniques, and procedures (TTP) development and operational realistic testing, and enable more realistic exercises combining air, space, and cyber effects. Continue Interim Contractor Support (ICS) of virtual range 1.5. Complete development of final Deployable Signal Monitoring Unit variant, Big Ben last part of the mobile/ transportable range asset, and commence SROC technology refresh complete Linux migration. Continue risk reduction/mitigation efforts for Space Orbital Engagement Range Risk Reduction Projects which will analyze potential range systems that will be used to support the live and virtual testing of new advanced development space systems, space operator orbital engagement maneuvers (OEM) advanced training, and future SPACE FLAG exercises using live and virtual systems. Continue overhaul of fixed range capabilities, general obsolescence, outdated servers, and software upgrades. Provide significant enhancements to include the future integration</p>	22.408	14.942	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206116F / <i>Space Test and Training Range Development</i>
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<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>into virtual environment. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	22.408	14.942	0.000

**D. Other Program Funding Summary (\$ in Millions)**  
N/A

**Remarks**

**E. Acquisition Strategy**  
All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force / BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206392F / <i>ACQ Workforce - Space &amp; Missile Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	180.512	167.810	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
664280: <i>SMC Civilian Pay</i>	-	180.512	167.810	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206392F, Space & Missile System Center (SMC) Acquisition Workforce efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206392SF, Space & Missile Systems Center (SMC) Acquisition Workforce from Appropriation 3600, Budget Activity 06 due to the creation of a new Appropriation for Space Force.

The Space and Missile Systems Center (SMC) equips US and allied forces with operational space and missile systems, launch systems, and command and control infrastructure in support of global military and national security operations. SMC operates with over 6,300 people and an annual budget exceeding \$6.4B providing joint warfighters navigation, communication, weather, warning, force application, and space control capabilities. In FY12, as an AF pilot initiative, SMC acquisition workforce civilian personnel funding was transferred from O&M to RDT&E, AF funds.

SMC is authorized to employ approximately 1,501 civilian acquisition professionals providing the management, tools, and technical capabilities needed to oversee acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel supporting the Los Angeles AFB 61 Air Base Group. Funding SMC civilian payroll from the RDT&E appropriation provides program managers the flexibility to hire additional civilian personnel with program dollars versus additional contractors in concert with Air Force initiatives in response to the Defense Acquisition Workforce Improvement Act. This program element supports both civilian pay and non-pay support requirements.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206392F / <i>ACQ Workforce - Space &amp; Missile Systems</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	169.912	167.810	170.760	0.000	170.760
Current President's Budget	180.512	167.810	0.000	0.000	0.000
Total Adjustments	10.600	0.000	-170.760	0.000	-170.760
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	10.600	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-170.760	0.000	-170.760

**Change Summary Explanation**

FY 2019: +\$10.000M reprogramming to fund SMC acquisition workforce shortfalls.

FY 2021: Funds transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> SMC Acquisition Workforce	180.512	167.810	0.000
<b>Description:</b> Provide professional government civilian acquisition workforce in support of all Space and Missile Systems Center programs. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc.			
\$5.007M of FY 2021 funds for the SMC Acquisition Workforce effort did not transfer properly from RDT&E, Air Force R-1 Line #144 to RDT&E, Space Force R-1 Line #21.			
<b>FY 2020 Plans:</b> N/A			
<b>FY 2021 Plans:</b> Provide professional government civilian acquisition workforce in support of all Space and Missile Systems Center programs.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A			
<b>Accomplishments/Planned Programs Subtotals</b>	180.512	167.810	0.000



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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206392F / <i>ACQ Workforce - Space &amp; Missile Systems</i>
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**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

N/A

**E. Acquisition Strategy**

N/A

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206398F / <i>Space &amp; Missile Systems Center - MHA</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	10.508	10.170	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
664280: <i>SMC Civilian Pay</i>	-	10.508	10.170	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206398F, Space & Missile System Center - MHA efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206398SF, Space & Missile Systems Center - MHA from Appropriation 3600, Budget Activity 06 due to the creation of a new Appropriation for Space Force.

The Space and Missile Systems Center (SMC) equips US and allied forces with operational space and missile systems, launch systems, and command and control infrastructure in support of global military and national security operations. SMC operates with over 6,300 people and an annual budget exceeding \$6.4B providing joint warfighters navigation, communication, weather, warning, force application, and space control capabilities. In FY 2012, as an AF pilot initiative, SMC acquisition workforce civilian personnel funding was transferred from O&M to RDT&E, AF funds.

Program Element 1206398F, Project: 664281 Space and Missile Systems Center - Major Headquarters Activities (MHA) was established to improve overall performance, strengthen business operations, and achieve efficiencies, effectiveness and cost savings that can be transferred to higher priority needs.

Space acquisition must respond with speed and agility to emerging adversary threats. SMC is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206398F / <i>Space &amp; Missile Systems Center - MHA</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	10.508	10.170	10.340	0.000	10.340
Current President's Budget	10.508	10.170	0.000	0.000	0.000
Total Adjustments	0.000	0.000	-10.340	0.000	-10.340
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-10.340	0.000	-10.340

**Change Summary Explanation**

FY 2021: Funds transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> SMC - Major Headquarters Activities</p> <p><b>Description:</b> Provide professional government civilian acquisition workforce in support of all Space and Missile Systems Center Management Headquarters Activities. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to SMC Staff support, studies, technical analysis, prototyping, etc.</p> <p>\$0.246M of FY 2021 funds for the SMC - Major Headquarters Activities effort did not transfer properly from RDT&amp;E, Air Force R-1 Line #145 to RDT&amp;E, Space Force R-1 Line #22.</p> <p><b>FY 2020 Plans:</b> N/A</p> <p><b>FY 2021 Plans:</b> Provide professional government civilian acquisition workforce in support of all Space and Missile Systems Center Management Headquarters Activities.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	10.508	10.170	0.000
<b>Accomplishments/Planned Programs Subtotals</b>	10.508	10.170	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Air Force Date: February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206398F / <i>Space &amp; Missile Systems Center - MHA</i>
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**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

N/A

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206860F / <i>Rocket Systems Launch Program (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	21.906	13.192	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	35.098
661023: <i>Rocket System Launch Program (RSLP)</i>	-	21.906	13.192	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	35.098
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

In FY 2021, PE 1206860F, Rocket Systems Launch Program (SPACE) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206860SF, Rocket Systems Launch Program (SPACE) from Appropriation 3600, Budget Activity 06 due to the creation of a new Appropriation for Space Force.

Rocket Systems Launch Program (RSLP) provides responsive space and Research, Development, Test and Evaluation (RDT&E) launch vehicle support to DoD and other government agencies using commercial launch systems and excess ballistic missile assets. The RSLP mission was established by the Secretary of Defense in 1972. The small launch program complements the National Security Space Launch (NSSL) program with multiple options to acquire dedicated spacelift and rideshare services for developmental, demonstration, and small operational space vehicles. It provides mission planning, payload integration, vehicle acquisition, processing, launch operations, booster storage and disposition, aging surveillance, maintenance and logistics support for selected DoD responsive space and RDT&E launches. Costs directly attributable to a specific launch or program (e.g., reliability of flight testing, maintenance of launch vehicle processing infrastructure) are paid by the user (Air Force, Navy, Army, Missile Defense Agency (MDA), Defense Advanced Research Project Agency (DARPA), National Reconnaissance Office (NRO), etc.). RSLP maintains exclusive control of deactivated Minuteman and Peacekeeper assets used in testing to include refurbishment, transportation and handling, storage, aging surveillance, and launch services. RSLP also funds general research, development, prototyping, integration, and supplemental reliability of flight testing efforts for launch to enhance the reliability of the Minotaur and other fleet vehicles (e.g., updates to the Modular Mechanical Ordnance Destruct System).

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Rocket Systems Launch weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support	<b>R-1 Program Element (Number/Name)</b> PE 1206860F I Rocket Systems Launch Program (SPACE)
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	19.721	13.192	17.999	0.000	17.999
Current President's Budget	21.906	13.192	0.000	0.000	0.000
Total Adjustments	2.185	0.000	-17.999	0.000	-17.999
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	2.451	0.000			
• SBIR/STTR Transfer	-0.266	0.000			
• Other Adjustments	0.000	0.000	-17.999	0.000	-17.999

**Change Summary Explanation**

FY2019: +\$2.451M, below threshold reprogramming to augment launch vehicle acquisition, processing, and launch services support.

FY2021: Funds were transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Storage/Refurbishment/Flight Readiness/Demil</p> <p><b>Description:</b> Storage, refurbishment, inventory control, and demil/disposal of deactivated Minuteman, Peacekeeper and other missile flight test assets</p> <p><b>FY 2020 Plans:</b> Continue storage, refurbishment, inventory control, and demil/disposal of deactivated Minuteman, Peacekeeper and other missile flight test assets and perform research and development support operations as required. Investigate and develop shipping throughput capacity to maximize opportunity for motor disposal. Continue support activities to include but not limited to sustainment replacement and refurbishment of support equipment, mission support, special studies etc.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>	15.773	10.844	0.000
<p><b>Title:</b> Aging Surveillance</p> <p><b>Description:</b> Perform aging surveillance-related activities on stored motors</p>	3.048	1.948	0.000



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206860F / <i>Rocket Systems Launch Program (SPACE)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>FY 2020 Plans:</b> Continue performing aging surveillance-related activities on stored motors; continue performing analysis/studies to identify and evaluate potential safety-related issues affecting stored motors; continue program office support and related support activities such as, but not limited to mission support, special studies, etc.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>				
<p><b>Title:</b> Other Launch Support Services</p> <p><b>Description:</b> Perform launch services activities</p> <p><b>FY 2020 Plans:</b> Continue launch vehicle acquisition, processing, launch services support, mission assurance, and operations to launch RDT&amp;E payloads.</p> <p>Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc.</p> <p><b>FY 2021 Plans:</b> N/A</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A</p>		3.085	0.400	0.000
<b>Accomplishments/Planned Programs Subtotals</b>		21.906	13.192	0.000
<b>D. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>E. Acquisition Strategy</b>				
N/A				

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206862F / <i>Tactically Responsive Launch</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	19.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	19.000
664235: <i>Tactically Responsive Launch</i>	-	0.000	19.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	19.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**A. Mission Description and Budget Item Justification**

Tactically Responsive Launch will demonstrate space launch operations that will enable the DoD space domain and strategic deterrence objectives. It will fund proof-of-concept tactically responsive space launch demonstrations using emerging and extant commercial launch providers with the goal to place or replace military capability on orbit within 24 hours.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Tactically Responsive Launch weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206862F / <i>Tactically Responsive Launch</i>
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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	19.000	0.000	0.000	0.000
Total Adjustments	0.000	19.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	19.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 664235: *Tactically Responsive Launch*

Congressional Add: *Tactically Responsive Launch*

	<b>FY 2019</b>	<b>FY 2020</b>
	0.000	19.000
Congressional Add Subtotals for Project: 664235	0.000	19.000
Congressional Add Totals for all Projects	0.000	19.000

**Change Summary Explanation**

FY2020: +\$19.000M Congressional add for tactically responsive launch

**C. Accomplishments/Planned Programs (\$ in Millions)**

	<b>FY 2019</b>	<b>FY 2020</b>
<b>Congressional Add:</b> Tactically Responsive Launch	0.000	19.000
<b>FY 2019 Accomplishments:</b> N/A		
<b>FY 2020 Plans:</b> Demonstrate proof-of-concept tactically responsive space launch capabilities using emerging and extant launch providers. Activities may include concept design, studies of commercial capabilities and operations, technical analysis, launch service acquisition, prototyping, rideshare service acquisition, processing, launch services support, mission assurance, operations; and tactics, techniques, and procedures, program office support, etc. for demonstration of responsive launch.		
<b>Congressional Adds Subtotals</b>	0.000	19.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206862F / <i>Tactically Responsive Launch</i>	
<b>D. Other Program Funding Summary (\$ in Millions)</b> N/A		
<b>Remarks</b>		
<b>E. Acquisition Strategy</b> Use new and existing launch service contracts, Small Business Innovative Research contracts, and Other Transaction Authority (OTA) Agreements to take advantage of evolving commercial capabilities.		

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206864F / <i>Space Test Program (STP)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	29.731	26.097	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
662617: <i>Free-Flyer Spacecraft Missions</i>	-	29.731	26.097	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**  
In FY2021, PE 1206864F, Space Test Program efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206864SF Space Test Program from Appropriation 3600, Budget Activity 06 due to the creation of a new Appropriation for Space Force.

**A. Mission Description and Budget Item Justification**

The Space Test Program (STP) conducts space test missions for the purpose of accelerating DoD space technology transformation while lowering developmental risk. The program integrates, launches, and operates an optimally selected number of DoD-sponsored experiments consistent with Space Experiments Review Board (SERB) priority, opportunity, and funding. STP missions provide a cost-effective way to flight test new militarily relevant space system technologies, concepts, and designs, providing a way to:

- Support the acquisition block development approach
- Demonstrate and develop responsive research and development (R&D) space capabilities
- Provide early operational capabilities to quickly react to new developments
- Perform operational risk reduction through direct flight test of prototype components
- Improve operational design by characterizing the space environment, event, or sensor physics proposed for an operational system/system upgrade
- Develop, integrate, test, and acquire advanced payload support hardware for launch vehicles (LV), commercial launch services, and human-rated spaceflight vehicles
- Expand and leverage international opportunities to further access for the US and its allies' R&D payloads

The Deputy Secretary of Defense Space Test Program Management & Funding Policy, issued in July 2002, reaffirmed STP as the primary provider of spaceflight for the DoD space research community. The July 2002 policy statement also reaffirmed STP's role as the single manager for all DoD payloads on the International Space Station (ISS).

Space acquisition must respond with speed and agility to emerging adversary threats. Space and Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified /classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanism to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new, or repurpose capabilities.

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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Air Force **Date:** February 2020

<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206864F / <i>Space Test Program (STP)</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver STP weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	25.620	26.097	26.550	0.000	26.550
Current President's Budget	29.731	26.097	0.000	0.000	0.000
Total Adjustments	4.111	0.000	-26.550	0.000	-26.550
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	4.955	0.000			
• SBIR/STTR Transfer	-0.844	0.000			
• Other Adjustments	0.000	0.000	-26.550	0.000	-26.550

**Change Summary Explanation**

FY 2019: \$4.955M increase for payload integration for STPSat-6 and on-orbit operations for STP-2 payloads.

FY 2021: -\$26.541M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Payload Integration</p> <p><b>Description:</b> Integrate payloads onto spaceflight missions, including free-flyer payloads, hosted payloads, sounding rockets, experiments on the International Space Station (ISS), and commercial missions. Includes acquisition of associated spacecraft and integration hardware.</p> <p><b>FY 2020 Plans:</b>                      Continue payload integration of STP-H7 and begin acquisition of STP-H9.                      Continue payload integration efforts and launch-based processing and launch operations for STPSat-6.                      Begin satellite acquisition and integration of STPSat-7.                      Exploring potential international rideshare opportunities and identify pathfinder for international Science &amp; Technology payload rideshare process.</p>	21.585	20.175	0.000



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> / BA 6: <i>RDT&amp;E Management Support</i>		<b>R-1 Program Element (Number/Name)</b> PE 1206864F / <i>Space Test Program (STP)</i>		
<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Continue program office and other related support activities that may include, but are not limited to studies, technical analysis, prototyping, etc. <b>FY 2021 Plans:</b> N/A <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A				
<b>Title:</b> Launch Vehicle and Launch Services <b>Description:</b> Purchase launch services, launch vehicles and launch vehicle support for free-flyer payloads, hosted payloads, sounding rockets, experiments on the ISS, and commercial spaceflight missions, and support the spaceflight worthiness and "Do No Harm" certification for Space and Missile Systems Center (SMC) and US Space Force (USSF) HQ. <b>FY 2020 Plans:</b> Launch STPSat-6 on STP-3 launch vehicle. Continue to support spaceflight worthiness and "Do No Harm" certification. <b>FY 2021 Plans:</b> N/A <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A		5.755	4.528	0.000
<b>Title:</b> On Orbit Satellite Operations <b>Description:</b> Execute first-year operations and operations support for STP-sponsored missions. <b>FY 2020 Plans:</b> Begin first year on-orbit operations support for STPSat-6 and the Long Duration Propulsive ESPA-1 (LDPE-1). Complete STP-2 payloads on-orbit support for GPIM and DSX and continue DSX on orbit operations for an additional year to satisfy SERB experiment objectives for DSX Cyber Hardness Augmentation of an On-Orbit Satellite (CHAOS). <b>FY 2021 Plans:</b> N/A <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> N/A		2.391	1.394	0.000
<b>Accomplishments/Planned Programs Subtotals</b>		29.731	26.097	0.000

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Air Force	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 6: RDT&amp;E Management Support</i>	<b>R-1 Program Element (Number/Name)</b> PE 1206864F / <i>Space Test Program (STP)</i>
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**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

In FY2021, PE 1206864F, Space Test Program efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206864SF Space Test Program from Appropriation 3600, Budget Activity 06 due to the creation of a new Appropriation for Space Force.

**E. Acquisition Strategy**

N/A