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

February 2020



**Army**

*Justification Book of*

***Research, Development, Test & Evaluation, Army***

**RDT&E – Volume III, Budget Activity 7**

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Army • Budget Estimates FY 2021 • RDT&E Program

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**RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY**  
**APPROPRIATION LANGUAGE**

For expenses necessary for basic and applied scientific research, development, test and evaluation, including maintenance, rehabilitation, lease, and operation of facilities and equipment, \$12,770,165,000.00 to remain available for obligation until September 30, 2022.

**COST STATEMENT**

The following Justification Books were prepared at a cost of \$460,861: Aircraft (ACFT), Missiles (MSLS), Weapons & Tracked Combat Vehicles (WTCV), Ammunition (AMMO), Other Procurement Army (OPA) 1 – Tactical & Support Vehicles, Other Procurement Army (OPA) 2 – Communications & Electronics, Other Procurement Army (OPA) 3 & 4 - Other Support Equipment & Spares, Research, Development, Test and Evaluation (RDTE) for: Budget Activity 1, Budget Activity 2, Budget Activity 3, Budget Activity 4, Budget Activity 5A, Budget Activity 5B, Budget Activity 5C, Budget Activity 6, Budget Activity 7, and Budget Activity 8.

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**FY 2021 RDT&E, ARMY PROGRAM ELEMENT DESCRIPTIVE SUMMARIES**  
**Introduction and Explanation of Contents**

1. **General.** The purpose of this document is to provide summary information concerning the Research, Development, Test and Evaluation, Army program. The descriptive summaries are comprised of R-2 (Army RDT&E Budget Item Justification – program element level), R-2A (Army RDT&E Budget Item Justification – project level), R-3 (Army RDT&E Cost Analysis), R-4 (Schedule Profile Detail) and R-5 (Termination Liability Funding for MDAPs) Exhibits, which provide narrative information on all RDT&E program elements and projects through FY 2020.
  
2. **Relationship of the FY 2021 Budget Submitted to Congress to the FY 2020 Budget Submitted to Congress.** This paragraph provides a list of program elements/projects that are major new starts, restructures, developmental transitions, and terminated programs. Explanations for these changes can be found in the narrative sections of the Program Element R-2A Exhibits.

**New Start Programs:**

<b><i>Budget Activity</i></b>	<b><i>OSDPE / Project</i></b>	<b><i>Project Title</i></b>
02	0602115A / EB2	HIV Biomedical Technology
02	0602134A / CD2	Counter Improvised-Threat Advanced Studies
02	0602146A / AQ2	EW Techniques Technology
02	0602146A / AQ7	High Tempo Data Driven Decision Tools Technology
03	0603002A / MP3	Phys Chem Toxicity Assessment Sys Adv Tech
03	0603115A / EB3	HIV Medical Development
03	0603134A / CD3	Counter Improvised-Threat Simulation
03	0603463A / AQ8	High Tempo Data Driven Decision Tools Adv Tech
03	0603463A / AR8	Sensing in Contested Environments Adv Tech
03	0603463A / AU2	Optimization of Geospatial Data for Visualization
03	0603463A / AV1	GEOInt/Ops Logistics Integration-Planning Adv Tech
03	0603463A / AW6	Modular GPS Independent Sensors Advanced Tech
03	0603920A / CD5	Humanitarian Demining
04	0603804A / EW8	Armored Engineer Vehicles
04	0604115A / AX3	Technology Maturation Initiatives

04	0604134A / CD4	Counter Improvised-Threat Demonstration
05	0304270A / FJ5	Terrestrial Layer System (MIP)
05	0604601A / S64	Common Remotely Operated Wpn Sys (CROWS)
05	0604604A / BX8	Cold Weather All-Terrain Vehicle (CATV)
05	0604622A / E50	TRAILER DEVELOPMENT
05	0604802A / XT2	40mm Door Breach
05	0605145A / CD6	Medical Products and Support Systems Development
06	0605801A / M23	US Army Corps of Engineers Base Operations
06	0606105A / CD7	Medical Program-Wide Activities
07	0203802A / VV2	TOW
07	0607145A / FD5	Apache Product Improvement
07	0203802A / VT9	Lethal Miniature Aerial Missile System (LMAMS)

**Program Element/Project Restructures:**

<b><u>Budget Activity</u></b>	<b><u>Old OSDPE / Project: Title</u></b>	<b><u>New OSDPE / Project</u></b>
02	0602141A / AH5: Projectile and Multi-Function Warhead Technologies	0602143A/AY6, 0602145A/BK5
02	0602143A / AN1: Narrowband SATCOM Technology	0602146A/BZ6, 060346A/AN2
02	0602143A / BE1: Support Technology to Mission Command	0602146A/AQ9
02	0602144A / BL4: Countermine Technology	0602145A/BF9
02	0602145A / BH2: C4ISR Modular Autonomy Technology	0602145A/BF9
02	0602145A / BH7: Enhanced VETRONICS Technology	0602145A/BH5
02	0602145A / BJ3: Hydrogen Based Combat System Technology	0602145A/BH5
02	0602145A / BJ7: Detection of Explosive Hazards Technology	0602145A/BF9
02	0602146A / AN3: Non Traditional Waveforms Technology	0603463A/AP6
02	0602146A / AV7: Atmospheric Modeling and Meteorological Technology	0603772A/101
02	0602147A / AF5: Simulation and Aerostructures Technology	0602147A/AE7
02	0602147A / AF6: Structures Technology	0602147A/AE7
02	0602147A / AF7: Warhead Integration Technology	0602147A/AE7

02	0602147A / AF9: Precision and Accuracy Technology	0602147A/AE7
02	0602147A / AG1: Missile Electronics Technology	0602147A/AE7
02	0602147A / AG2: Information and Signal Processing Technology	0602147A/AE7
02	0602147A / AG8: Advanced Energetics Technology	0602141A/AH9
02	0602147A / AG9: Multiple Simul Engagement Technologies (MSET) Tech	0602148A/AK4
02	0602148A / AI7: Alternative Concept Engine Technology	0602148A/AM4
02	0602148A / AK1: UAS Survivability Technology	0603465A/AK3
02	0602148A / AK6: Advanced Rotorcraft Armaments Protection System Te	0603465A/AK7, 0633465A/CA8
02	0602148A / AM2: Aircraft and Aircrew Protection Technology	0602148A/AJ4
02	0602150A / AD7: Missile Fire Control Sensors Technology	0602150A/AD3
02	0602787A / 874: Cbt Casualty Care Tech	0602787A/MM4
03	0603002A / MG4: Tech Base/Enabling Res in Mil Occup Med Adv Tech	0603002A/MN7, MN9, MO3, MO8, MP3
03	0603002A / MM5: Tech Base/Enabling Res Combat Cas Care Adv Tech	0603002A/MN3, MN4, MN5, MO2, MO4, MO7
03	0603002A / MM9: Tech Base/Enabling Rsrch for Infect Dis Adv Tech	0603002A/MO9, 0602787A/MM8
03	0603002A / MN8: Drugs to Prevent and Treat Malaria Advanced Tech	0602787A/MM8
03	0603002A / MO3: Military Occupational Fitness Standards Adv Tech	0603002A/MN7
03	0603118A / AZ8: Soldier Squad Small Arms Armaments Adv Tech	0602143/AY8, 0603463A/AQ1
03	0603462A / BH3: C4ISR Modular Autonomy Advanced Technology	0603462A/BZ9
03	0603462A / BI1: Protection for Autonomous Systems Adv Tech	0603462A/BG7
03	0603462A / BJ6: Hydrogen Based Combat System Advanced Technology	0603462A/BH6
03	0603462A / BJ8: Detection of Explosive Hazards Advanced Technology	0602145A/BF9
03	0603463A / AR2: Energy Informed Operations Advanced Technology	0603465A/AM5
03	0603463A / AU6: Automated Analytics for Operational Environment AT	0602146/AT7
03	0603464A / AF4: Missile Simulation Advanced Technology	0602147/AF8
03	0603464A / AH3: Single Multi-mission Attack Missile Adv Tech	0603465A/AK5
03	0603464A / BS3: Strategic Missile Advanced Technology	0603464A/BY2
03	0603465A / AI6: Next Gen Tactical UAS TD Advanced Technology	0603465A
03	0603465A / AM3: Aircraft and Aircrew Protection Advanced Tech	0603465A/AJ5
03	0603466A / AC8: Low Cost Extended Range Air Defense Adv Tech	0603466A/AD4
04	1206120A / FJ8: Assured Positioning, Navigation and Timing (PNT)	0604120A/ED5, BV4

04	1206120A / FJ9: Dismounted A-PNT	0604120A/EH8
04	1206120A / FK2: Mounted A-PNT	0604120A/EJ2
04	1206120A / FK3: Anti-Jam Antenna	0604120A/EJ2
04	1206308A / FE5: Space And Missile Defense Integration	0603308A/990
04	0603639A / EB8: OWL for Small Caliber Ammunition	0604802A/EP4
04	0603639A / EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	0604802A/FL4
04	0603639A / EU3: .50 Caliber All-Purpose Tactical Cartridge (APTC)	0604802A/EU5
04	0604541A / BT1: Interoperability	0604541A/BT3, BT5
04	0604541A / BT4: Network Technology Maturation Initiatives (NTMI)	0604541A/BT5
05	0604798A / DY3: NIE Test & Evaluation	0604798A/DY7
05	0604798A / DZ6: Army Integration Management & Coordination	0605054A/FL7
06	0605326A / 33B: Soldier-Centered Analyses For Future Force	0605604A/675
07	1203142A / FE1: Dscs-Dcs (Phase II)	0303142A/253
07	1203142A / FE2: MILSATCOM System Engineering	0303142A/456
07	1203142A / FI8: Protected Anti-JAM Tactical SATCOM	0303142A/456
07	1208053A / FE7: Joint Tact Grd Station-P3I(MIP)	0208053A/635
07	0303028A / FG2: Counterintelligence & Human Intel Modernization	0607150A/BS5
07	0303028A / H13: Information Dominance Center (IDC) - Tiara	0607150A/BS5
07	0305232A / RA7: RQ-11 Raven (MIP)	0604101A/BR6, 0605205A/BR7

**Program Terminations (including transfers to Procurement and Sustainment):**

<b><u>Budget Activity</u></b>	<b><u>OSDPE / Project</u></b>	<b><u>Project Title</u></b>
02	0602146A / AN5	Protected SATCOM-WB Global SATCOM Inter Canc Tech
02	0602146A / AU5	Automated Analytics for Operational Environment
02	0602146A / AW5	Modular GPS Independent Sensors Technology
02	0602147A / AH2	Single Multi-mission Attack Missile (SMAM) Technol
02	0602213A / CY9	Decoy and Deterrence Technology
02	0602787A / VB4	System Biology And Network Science Technology
03	0603457A / 7CY	Decoy and Deterrence Advanced Technology

03	0603462A / BF5	Adv Lethality & Accuracy Sys for Med Cal Adv Tech
03	0603463A / AW2	Autonomous Navigation Advanced Technology
03	0603464A / AE6	Strategic Long Range Cannon Advanced Technology
03	0603465A / AI4	Joint Multi-Role (JMR) Demonstration Advanced Tech
03	0603465A / AL6	Degraded Vis Environ Mitigation (DVE-M) Adv Tech
04	1206120A / FK1	PSEUDOLITES
04	0603804A / G11	Adv Elec Energy Con Ad
04	0604115A / AX8	Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)
04	0604644A / MR1	Mobile Intermediate Range Missile
05	0604201A / EW7	Degraded Visual Environment
05	0604601A / FI2	Lightweight 30mm Cannon
05	0604710A / L76	Dismounted Fire Support Laser Targeting Systems
05	0604802A / ED7	Advanced Multipurpose (AMP) Cartridge
05	0604802A / EU7	Enhanced Lethality Cannon Munitions
05	0604804A / FG4	Ultra-Lightweight Camouflage Net System (ULCANS)
05	0604804A / L43	ENGINEER SUPPORT EQUIPMENT - ED
05	0604827A / S65	Platoon Power Generator
05	0604852A / XU9	Active Protection System
05	0604854A / 509	LIGHTWEIGHT 155M HOWITZER
05	0605013A / 193	Medical Communications For Combat Casualty
05	0605013A / XV6	Army Leader Dashboard
05	0605029A / EQ2	IntegGrdSecSurvRespC(IGSSR-C)
05	0605034A / EQ4	Tactical Security System (TSS)
05	0605036A / EQ5	Combating Weapons of Mass Destruction (CWMD)
05	0605049A / XT4	Advanced Threat Detection System (ATDS)
05	0605053A / FB2	Man Transportable Robotic System (MTRS) Inc II
05	0605053A / FB9	MTRS Standardization
06	0605805A / 857	DoD Explosives Safety Standards
06	0606001A / FD4	Military Ground-Based CREW Technology
07	0303150A / C86	Army Global C2 System

07	0305233A / RQ7	RQ-7 Shadow UAV
07	0307665A / FL5	Next Gen Biometric Collection Capability (MIP)
07	0607138A / ES5	Fixed Wing Product Improvement Program
07	0607665A / DT2	Non-MIP Biometrics

3. **Classification:** This document contains no classified data. Appropriately cleared individuals can obtain further information on Classified/Special Access Programs by contacting the Department of the Army.





Department of Defense  
FY 2021 President's Budget  
Exhibit R-1 FY 2021 President's Budget  
Total Obligational Authority  
(Dollars in Thousands)

17 Jan 2020

Appropriation	FY 2019	FY 2020	FY 2020	FY 2020	FY 2020	FY 2020
	(Base + OCO)	Base Enacted	Emergency	OCO Enacted	OCO Enacted	Total Enacted (Base+Emerg+ OCO)
Research, Development, Test & Eval, Army	11,371,268	12,543,435		147,304		12,690,739
Total Research, Development, Test & Evaluation	11,371,268	12,543,435		147,304		12,690,739

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Department of Defense  
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17 Jan 2020

Appropriation	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)
Research, Development, Test & Eval, Army	12,587,343		182,824	182,824	12,770,167
Total Research, Development, Test & Evaluation	12,587,343		182,824	182,824	12,770,167



Department of Defense  
 FY 2021 President's Budget  
 Exhibit R-1 FY 2021 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

17 Jan 2020

Summary Recap of Budget Activities	FY 2019	FY 2020	FY 2020	FY 2020	FY 2020	FY 2020
	(Base + OCO)	Base Enacted	Emergency	OCO Enacted	OCO Enacted	Total Enacted (Base+Emerg+ OCO)
Basic Research	491,263	574,484				574,484
Applied Research	1,553,764	1,259,374				1,259,374
Advanced Technology Development	1,561,576	1,531,516				1,531,516
Advanced Component Development & Prototypes	1,213,569	2,975,681		11,114		2,986,795
System Development & Demonstration	3,119,552	2,989,779		100,147		3,089,926
Management Support	1,710,179	1,368,475		1,875		1,370,350
Operational Systems Development	1,721,365	1,844,126		34,168		1,878,294
Software and Digital Technology Pilot Programs						
Total Research, Development, Test & Evaluation	11,371,268	12,543,435		147,304		12,690,739
Summary Recap of FYDP Programs						
General Purpose Forces	646,373	765,324				765,324
Intelligence and Communications	311,699	236,563		37,368		273,931
Research and Development	10,090,836	11,139,975		109,936		11,249,911
Central Supply and Maintenance	106,766	108,348				108,348
Administration and Associated Activities	358					
Space	209,281	285,952				285,952
Classified Programs	5,955	7,273				7,273
Total Research, Development, Test & Evaluation	11,371,268	12,543,435		147,304		12,690,739

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17 Jan 2020

	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)
<u>Summary Recap of Budget Activities</u>					
Basic Research	463,359				463,359
Applied Research	920,881		2,000	2,000	922,881
Advanced Technology Development	1,203,590				1,203,590
Advanced Component Development & Prototypes	3,421,608		2,520	2,520	3,424,128
System Development & Demonstration	3,199,798		97,825	97,825	3,297,623
Management Support	1,333,123		5,137	5,137	1,338,260
Operational Systems Development	1,998,539		75,342	75,342	2,073,881
Software and Digital Technology Pilot Programs	46,445				46,445
Total Research, Development, Test & Evaluation	12,587,343		182,824	182,824	12,770,167
<u>Summary Recap of FYDP Programs</u>					
General Purpose Forces	923,370		2,300	2,300	925,670
Intelligence and Communications	309,698		76,942	76,942	386,640
Research and Development	11,289,280		103,582	103,582	11,392,862
Central Supply and Maintenance	61,012				61,012
Administration and Associated Activities					
Space					
Classified Programs	3,983				3,983
Total Research, Development, Test & Evaluation	12,587,343		182,824	182,824	12,770,167

Department of the Army  
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 Total Obligational Authority  
 (Dollars in Thousands)

17 Jan 2020

Summary Recap of Budget Activities	FY 2019	FY 2020	FY 2020	FY 2020	FY 2020
	(Base + OCO)	Base Enacted	Emergency	OCO Enacted	Total Enacted (Base+Emerg+ OCO)
Basic Research	491,263	574,484			574,484
Applied Research	1,553,764	1,259,374			1,259,374
Advanced Technology Development	1,561,576	1,531,516			1,531,516
Advanced Component Development & Prototypes	1,213,569	2,975,681		11,114	2,986,795
System Development & Demonstration	3,119,552	2,989,779		100,147	3,089,926
Management Support	1,710,179	1,368,475		1,875	1,370,350
Operational Systems Development	1,721,365	1,844,126		34,168	1,878,294
Software and Digital Technology Pilot Programs					
Total Research, Development, Test & Evaluation	11,371,268	12,543,435		147,304	12,690,739
Summary Recap of FYDP Programs					
General Purpose Forces	646,373	765,324			765,324
Intelligence and Communications	311,699	236,563		37,368	273,931
Research and Development	10,090,836	11,139,975		109,936	11,249,911
Central Supply and Maintenance	106,766	108,348			108,348
Administration and Associated Activities	358				
Space	209,281	285,952			285,952
Classified Programs	5,955	7,273			7,273
Total Research, Development, Test & Evaluation	11,371,268	12,543,435		147,304	12,690,739

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Department of the Army  
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 (Dollars in Thousands)

17 Jan 2020

	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					
Basic Research	463,359				463,359
Applied Research	920,881		2,000	2,000	922,881
Advanced Technology Development	1,203,590				1,203,590
Advanced Component Development & Prototypes	3,421,608		2,520	2,520	3,424,128
System Development & Demonstration	3,199,798		97,825	97,825	3,297,623
Management Support	1,333,123		5,137	5,137	1,338,260
Operational Systems Development	1,998,539		75,342	75,342	2,073,881
Software and Digital Technology Pilot Programs	46,445				46,445
Total Research, Development, Test & Evaluation	12,587,343		182,824	182,824	12,770,167
Summary Recap of FYDP Programs					
General Purpose Forces	923,370		2,300	2,300	925,670
Intelligence and Communications	309,698		76,942	76,942	386,640
Research and Development	11,289,280		103,582	103,582	11,392,862
Central Supply and Maintenance	61,012				61,012
Administration and Associated Activities					
Space					
Classified Programs	3,983				3,983
Total Research, Development, Test & Evaluation	12,587,343		182,824	182,824	12,770,167

Department of the Army  
 FY 2021 President's Budget  
 Exhibit R-1 FY 2021 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

17 Jan 2020

Appropriation: 2040A Research, Development, Test & Eval, Army

Program Line Element No	Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted S (Base+Emerg+ OCO)
1	0601101A In-House Laboratory Independent Research	01	11,391				U
2	0601102A Defense Research Sciences	01	306,347	354,480			354,480 U
3	0601103A University Research Initiatives	01	62,813	87,858			87,858 U
4	0601104A University and Industry Research Centers	01	110,712	127,164			127,164 U
5	0601121A Cyber Collaborative Research Alliance	01		4,982			4,982 U
	Basic Research		491,263	574,484			574,484
6	0602105A Materials Technology	02	79,432				U
7	0602115A Biomedical Technology	02					U
8	0602120A Sensors and Electronic Survivability	02	90,023				U
9	0602122A TRACTOR HIP	02	8,674				U
10	0602126A TRACTOR JACK	02	400				U
11	0602134A Counter Improvised-Threat Advanced Studies	02					U
12	0602141A Lethality Technology	02		69,961			69,961 U
13	0602142A Army Applied Research	02		30,819			30,819 U
14	0602143A Soldier Lethality Technology	02		145,900			145,900 U
15	0602144A Ground Technology	02		143,899			143,899 U
16	0602145A Next Generation Combat Vehicle Technology	02		263,547			263,547 U
17	0602146A Network C3I Technology	02		138,016			138,016 U

R-121PB: FY 2021 President's Budget (Published Version), as of January 17, 2020 at 11:58:58

Department of the Army  
 FY 2021 President's Budget  
 Exhibit R-1 FY 2021 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

17 Jan 2020

Appropriation: 2040A Research, Development, Test & Eval, Army

Line No	Program Element No	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)	U
1	0601101A	In-House Laboratory Independent Research	01						U
2	0601102A	Defense Research Sciences	01	303,257				303,257	U
3	0601103A	University Research Initiatives	01	67,148				67,148	U
4	0601104A	University and Industry Research Centers	01	87,877				87,877	U
5	0601121A	Cyber Collaborative Research Alliance	01	5,077				5,077	U
		Basic Research		463,359				463,359	
6	0602105A	Materials Technology	02						U
7	0602115A	Biomedical Technology	02	11,835				11,835	U
8	0602120A	Sensors and Electronic Survivability	02						U
9	0602122A	TRACTOR HIP	02						U
10	0602126A	TRACTOR JACK	02						U
11	0602134A	Counter Improvised-Threat Advanced Studies	02	2,000				2,000	U
12	0602141A	Lethality Technology	02	42,425				42,425	U
13	0602142A	Army Applied Research	02	30,757				30,757	U
14	0602143A	Soldier Lethality Technology	02	125,435				125,435	U
15	0602144A	Ground Technology	02	28,047				28,047	U
16	0602145A	Next Generation Combat Vehicle Technology	02	217,565		2,000	2,000	219,565	U
17	0602146A	Network C3I Technology	02	114,404				114,404	U



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17 Jan 2020

Appropriation: 2040A Research, Development, Test & Eval, Army

Program Line Element No	Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted S (Base+Emerg+ OCO)	
18 0602147A	Long Range Precision Fires Technology	02		120,327			120,327	U
19 0602148A	Future Verticle Lift Technology	02		98,359			98,359	U
20 0602150A	Air and Missile Defense Technology	02		95,771			95,771	U
21 0602211A	Aviation Technology	02	80,424					U
22 0602213A	C3I Applied Cyber	02		18,947			18,947	U
23 0602270A	Electronic Warfare Technology	02	25,127					U
24 0602303A	Missile Technology	02	90,496					U
25 0602307A	Advanced Weapons Technology	02	43,454					U
26 0602308A	Advanced Concepts and Simulation	02	28,623					U
27 0602601A	Combat Vehicle and Automotive Technology	02	102,899					U
28 0602618A	Ballistics Technology	02	86,737					U
29 0602622A	Chemical, Smoke and Equipment Defeating Technology	02	4,884					U
30 0602623A	Joint Service Small Arms Program	02	11,890					U
31 0602624A	Weapons and Munitions Technology	02	379,833					U
32 0602705A	Electronics and Electronic Devices	02	98,855					U
33 0602709A	Night Vision Technology	02	33,218					U
34 0602712A	Countermine Systems	02	26,594					U
35 0602716A	Human Factors Engineering Technology	02	23,755					U
36 0602720A	Environmental Quality Technology	02	15,364					U

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18	0602147A	Long Range Precision Fires Technology	02	60,553			60,553	60,553	U
19	0602148A	Future Verticle Lift Technology	02	96,484			96,484	96,484	U
20	0602150A	Air and Missile Defense Technology	02	56,298			56,298	56,298	U
21	0602211A	Aviation Technology	02						U
22	0602213A	C3I Applied Cyber	02	18,816			18,816	18,816	U
23	0602270A	Electronic Warfare Technology	02						U
24	0602303A	Missile Technology	02						U
25	0602307A	Advanced Weapons Technology	02						U
26	0602308A	Advanced Concepts and Simulation	02						U
27	0602601A	Combat Vehicle and Automotive Technology	02						U
28	0602618A	Ballistics Technology	02						U
29	0602622A	Chemical, Smoke and Equipment Defeating Technology	02						U
30	0602623A	Joint Service Small Arms Program	02						U
31	0602624A	Weapons and Munitions Technology	02						U
32	0602705A	Electronics and Electronic Devices	02						U
33	0602709A	Night Vision Technology	02						U
34	0602712A	Countermine Systems	02						U
35	0602716A	Human Factors Engineering Technology	02						U
36	0602720A	Environmental Quality Technology	02						U

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37 0602782A	Command, Control, Communications Technology	02	51,685					U
38 0602783A	Computer and Software Technology	02	14,622					U
39 0602784A	Military Engineering Technology	02	96,922					U
40 0602785A	Manpower/Personnel/Training Technology	02	17,157	20,873			20,873	U
41 0602786A	Warfighter Technology	02	55,467					U
42 0602787A	Medical Technology	02	87,229	112,955			112,955	U
	Applied Research		1,553,764	1,259,374			1,259,374	
43 0603001A	Warfighter Advanced Technology	03	40,501					U
44 0603002A	Medical Advanced Technology	03	94,575	83,030			83,030	U
45 0603003A	Aviation Advanced Technology	03	165,035					U
46 0603004A	Weapons and Munitions Advanced Technology	03	240,862					U
47 0603005A	Combat Vehicle and Automotive Advanced Technology	03	171,448					U
48 0603006A	Space Application Advanced Technology	03	48,542					U
49 0603007A	Manpower, Personnel and Training Advanced Technology	03	6,270	11,038			11,038	U
50 0603009A	TRACTOR HIKE	03	22,631					U
51 0603015A	Next Generation Training & Simulation Systems	03	27,711					U
52 0603115A	Medical Development	03						U

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37 0602782A	Command, Control, Communications Technology	02						U
38 0602783A	Computer and Software Technology	02						U
39 0602784A	Military Engineering Technology	02						U
40 0602785A	Manpower/Personnel/Training Technology	02	20,766				20,766	U
41 0602786A	Warfighter Technology	02						U
42 0602787A	Medical Technology	02	95,496				95,496	U
	Applied Research		920,881		2,000	2,000	922,881	
43 0603001A	Warfighter Advanced Technology	03						U
44 0603002A	Medical Advanced Technology	03	38,896				38,896	U
45 0603003A	Aviation Advanced Technology	03						U
46 0603004A	Weapons and Munitions Advanced Technology	03						U
47 0603005A	Combat Vehicle and Automotive Advanced Technology	03						U
48 0603006A	Space Application Advanced Technology	03						U
49 0603007A	Manpower, Personnel and Training Advanced Technology	03	11,659				11,659	U
50 0603009A	TRACTOR HIKE	03						U
51 0603015A	Next Generation Training & Simulation Systems	03						U
52 0603115A	Medical Development	03	27,723				27,723	U

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53 0603117A	Army Advanced Technology Development	03		66,338			66,338 U
54 0603118A	Soldier Lethality Advanced Technology	03		135,968			135,968 U
55 0603119A	Ground Advanced Technology	03		136,793			136,793 U
56 0603125A	Combating Terrorism - Technology Development	03	43,910				U
57 0603130A	TRACTOR NAIL	03	4,896				U
58 0603131A	TRACTOR EGGS	03	6,041				U
59 0603134A	Counter Improvised-Threat Simulation	03					U
60 0603270A	Electronic Warfare Technology	03	40,461				U
61 0603313A	Missile and Rocket Advanced Technology	03	92,404				U
62 0603322A	TRACTOR CAGE	03	16,845				U
63 0603457A	C3I Cyber Advanced Development	03		23,769			23,769 U
64 0603461A	High Performance Computing Modernization Program	03	211,457	224,755			224,755 U
65 0603462A	Next Generation Combat Vehicle Advanced Technology	03		260,535			260,535 U
66 0603463A	Network C3I Advanced Technology	03		142,899			142,899 U
67 0603464A	Long Range Precision Fires Advanced Technology	03		189,386			189,386 U
68 0603465A	Future Vertical Lift Advanced Technology	03		174,892			174,892 U

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53	0603117A	Army Advanced Technology Development	03	62,663				62,663	U
54	0603118A	Soldier Lethality Advanced Technology	03	109,608				109,608	U
55	0603119A	Ground Advanced Technology	03	14,795				14,795	U
56	0603125A	Combating Terrorism - Technology Development	03						U
57	0603130A	TRACTOR NAIL	03						U
58	0603131A	TRACTOR EGGS	03						U
59	0603134A	Counter Improvised-Threat Simulation	03	25,000				25,000	U
60	0603270A	Electronic Warfare Technology	03						U
61	0603313A	Missile and Rocket Advanced Technology	03						U
62	0603322A	TRACTOR CAGE	03						U
63	0603457A	C3I Cyber Advanced Development	03	23,357				23,357	U
64	0603461A	High Performance Computing Modernization Program	03	188,024				188,024	U
65	0603462A	Next Generation Combat Vehicle Advanced Technology	03	199,358				199,358	U
66	0603463A	Network C3I Advanced Technology	03	158,608				158,608	U
67	0603464A	Long Range Precision Fires Advanced Technology	03	121,060				121,060	U
68	0603465A	Future Vertical Lift Advanced Technology	03	156,194				156,194	U

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69 0603466A	Air and Missile Defense Advanced Technology	03		82,113			82,113 U
70 0603606A	Landmine Warfare and Barrier Advanced Technology	03	16,860				U
71 0603607A	Joint Service Small Arms Program	03	22,628				U
72 0603710A	Night Vision Advanced Technology	03	69,094				U
73 0603728A	Environmental Quality Technology Demonstrations	03	28,079				U
74 0603734A	Military Engineering Advanced Technology	03	100,359				U
75 0603772A	Advanced Tactical Computer Science and Sensor Technology	03	45,799				U
76 0603794A	C3 Advanced Technology	03	45,168				U
77 0603920A	Humanitarian Demining	03					U
	Advanced Technology Development		1,561,576	1,531,516			1,531,516
78 0603305A	Army Missile Defense Systems Integration	04	60,301	59,487			59,487 U
79 0603308A	Army Space Systems Integration	04					U
80 0603327A	Air and Missile Defense Systems Engineering	04	44,743	52,480		500	52,980 U
81 0603619A	Landmine Warfare and Barrier - Adv Dev	04	40,255	82,915			82,915 U
82 0603627A	Smoke, Obscurant and Target Defeating Sys-Adv Dev	04	19,852				U
83 0603639A	Tank and Medium Caliber Ammunition	04	40,358	77,696			77,696 U

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69	0603466A	Air and Missile Defense Advanced Technology	03	58,130				58,130	U
70	0603606A	Landmine Warfare and Barrier Advanced Technology	03						U
71	0603607A	Joint Service Small Arms Program	03						U
72	0603710A	Night Vision Advanced Technology	03						U
73	0603728A	Environmental Quality Technology Demonstrations	03						U
74	0603734A	Military Engineering Advanced Technology	03						U
75	0603772A	Advanced Tactical Computer Science and Sensor Technology	03						U
76	0603794A	C3 Advanced Technology	03						U
77	0603920A	Humanitarian Demining	03	8,515				8,515	U
		Advanced Technology Development		1,203,590				1,203,590	
78	0603305A	Army Missile Defense Systems Integration	04	11,062				11,062	U
79	0603308A	Army Space Systems Integration	04	26,230				26,230	U
80	0603327A	Air and Missile Defense Systems Engineering	04	26,482		500	500	26,982	U
81	0603619A	Landmine Warfare and Barrier - Adv Dev	04	64,092				64,092	U
82	0603627A	Smoke, Obscurant and Target Defeating Sys-Adv Dev	04						U
83	0603639A	Tank and Medium Caliber Ammunition	04	92,753				92,753	U



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84 0603645A	Armored System Modernization - Adv Dev	04	80,106	144,234			144,234 U
85 0603747A	Soldier Support and Survivability	04	8,067	6,514		3,000	9,514 U
86 0603766A	Tactical Electronic Surveillance System - Adv Dev	04	35,667	37,490			37,490 U
87 0603774A	Night Vision Systems Advanced Development	04	7,072	200,791			200,791 U
88 0603779A	Environmental Quality Technology - Dem/Val	04	14,190	19,561			19,561 U
89 0603790A	NATO Research and Development	04	3,564	5,406			5,406 U
90 0603801A	Aviation - Adv Dev	04	93,885	505,890			505,890 U
91 0603804A	Logistics and Engineer Equipment - Adv Dev	04	18,845	6,254		1,085	7,339 U
92 0603807A	Medical Systems - Adv Dev	04	38,371	36,975			36,975 U
93 0603827A	Soldier Systems - Advanced Development	04	30,384	26,113			26,113 U
94 0604017A	Robotics Development	04	70,745	84,381			84,381 U
95 0604020A	Cross Functional Team (CFT) Advanced Development & Prototyping	04	8,225				U
96 0604021A	Electronic Warfare Technology Maturation (MIP)	04		23,043			23,043 U
97 0604035A	Low Earth Orbit (LEO) Satellite Capability	04					U
98 0604100A	Analysis Of Alternatives	04	9,396	10,023			10,023 U

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84	0603645A	Armored System Modernization - Adv Dev	04	151,478			151,478	151,478	U
85	0603747A	Soldier Support and Survivability	04	5,841			5,841	5,841	U
86	0603766A	Tactical Electronic Surveillance System - Adv Dev	04	194,775			194,775	194,775	U
87	0603774A	Night Vision Systems Advanced Development	04	24,316			24,316	24,316	U
88	0603779A	Environmental Quality Technology - Dem/Val	04	13,387			13,387	13,387	U
89	0603790A	NATO Research and Development	04	4,762			4,762	4,762	U
90	0603801A	Aviation - Adv Dev	04	647,937			647,937	647,937	U
91	0603804A	Logistics and Engineer Equipment - Adv Dev	04	4,761			4,761	4,761	U
92	0603807A	Medical Systems - Adv Dev	04	28,520			28,520	28,520	U
93	0603827A	Soldier Systems - Advanced Development	04	26,138			26,138	26,138	U
94	0604017A	Robotics Development	04	121,207			121,207	121,207	U
95	0604020A	Cross Functional Team (CFT) Advanced Development & Prototyping	04						U
96	0604021A	Electronic Warfare Technology Maturation (MIP)	04	22,840			22,840	22,840	U
97	0604035A	Low Earth Orbit (LEO) Satellite Capability	04	22,678			22,678	22,678	U
98	0604100A	Analysis Of Alternatives	04	10,082			10,082	10,082	U

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99 0604101A	Small Unmanned Aerial Vehicle (SUAV) (6.4)	04						U
100 0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04	12,393	40,745			40,745	U
101 0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	84,981	379,772			379,772	U
102 0604115A	Technology Maturation Initiatives	04	91,749	179,676			179,676	U
103 0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04	75,711	42,900			42,900	U
104 0604118A	TRACTOR BEAM	04	52,894					U
105 0604119A	Army Advanced Component Development & Prototyping	04		112,806		4,529	117,335	U
106 0604120A	Assured Positioning, Navigation and Timing (PNT)	04						U
107 0604121A	Synthetic Training Environment Refinement & Prototyping	04	39,890	103,621			103,621	U
108 0604134A	Counter Improvised-Threat Demonstration, Prototype Development, and Testing	04						U
109 0604182A	Hypersonics	04		404,000			404,000	U
110 0604319A	Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	04	10,324					U
111 0604403A	Future Interceptor	04		2,000			2,000	U
112 0604541A	Unified Network Transport	04		29,700			29,700	U
113 0604644A	Mobile Medium Range Missile	04		5,000			5,000	U

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99 0604101A	Small Unmanned Aerial Vehicle (SUAV) (6.4)	04	1,378				1,378	U
100 0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04	40,083				40,083	U
101 0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	376,373				376,373	U
102 0604115A	Technology Maturation Initiatives	04	156,834				156,834	U
103 0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04	4,995				4,995	U
104 0604118A	TRACTOR BEAM	04						U
105 0604119A	Army Advanced Component Development & Prototyping	04	170,490				170,490	U
106 0604120A	Assured Positioning, Navigation and Timing (PNT)	04	128,125				128,125	U
107 0604121A	Synthetic Training Environment Refinement & Prototyping	04	129,547				129,547	U
108 0604134A	Counter Improvised-Threat Demonstration, Prototype Development, and Testing	04	13,831				13,831	U
109 0604182A	Hypersonics	04	801,417				801,417	U
110 0604319A	Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	04						U
111 0604403A	Future Interceptor	04	7,992				7,992	U
112 0604541A	Unified Network Transport	04	40,677				40,677	U
113 0604644A	Mobile Medium Range Missile	04						U

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114 0604785A	Integrated Base Defense (Budget Activity 4)	04		52,102		2,000	2,000 U
115 0305251A	Cyberspace Operations Forces and Force Support	04	52,817	52,102			52,102 U
116 1206120A	Assured Positioning, Navigation and Timing (PNT)	04	123,364	139,110			139,110 U
117 1206308A	Army Space Systems Integration	04	45,420	104,996			104,996 U
	Advanced Component Development & Prototypes		1,213,569	2,975,681		11,114	2,986,795
118 0604201A	Aircraft Avionics	05	31,401	8,414			8,414 U
119 0604270A	Electronic Warfare Development	05	56,310	59,539			59,539 U
120 0604328A	TRACTOR CAGE	05	27,050				U
121 0604601A	Infantry Support Weapons	05	74,629	87,179			87,179 U
122 0604604A	Medium Tactical Vehicles	05	3,905				U
123 0604611A	JAVELIN	05	5,250	14,997			14,997 U
124 0604622A	Family of Heavy Tactical Vehicles	05	11,182	13,125			13,125 U
125 0604633A	Air Traffic Control	05	11,580	5,781			5,781 U
126 0604642A	Light Tactical Wheeled Vehicles	05	1,013	2,965			2,965 U
127 0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	359,017	285,136			285,136 U
128 0604710A	Night Vision Systems - Eng Dev	05	139,337	143,696			143,696 U
129 0604713A	Combat Feeding, Clothing, and Equipment	05	4,393	7,393			7,393 U

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114	0604785A Integrated Base Defense (Budget Activity 4)	04			2,020	2,020	2,020	U
115	0305251A Cyberspace Operations Forces and Force Support	04	50,525				50,525	U
116	1206120A Assured Positioning, Navigation and Timing (PNT)	04						U
117	1206308A Army Space Systems Integration	04						U
	Advanced Component Development & Prototypes		3,421,608		2,520	2,520	3,424,128	
118	0604201A Aircraft Avionics	05	2,764				2,764	U
119	0604270A Electronic Warfare Development	05	62,426				62,426	U
120	0604328A TRACTOR CAGE	05						U
121	0604601A Infantry Support Weapons	05	91,574				91,574	U
122	0604604A Medium Tactical Vehicles	05	8,523				8,523	U
123	0604611A JAVELIN	05	7,493				7,493	U
124	0604622A Family of Heavy Tactical Vehicles	05	24,792				24,792	U
125	0604633A Air Traffic Control	05	3,511				3,511	U
126	0604642A Light Tactical Wheeled Vehicles	05	1,976				1,976	U
127	0604645A Armored Systems Modernization (ASM) - Eng Dev	05	135,488				135,488	U
128	0604710A Night Vision Systems - Eng Dev	05	61,445				61,445	U
129	0604713A Combat Feeding, Clothing, and Equipment	05	2,814				2,814	U

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130 0604715A	Non-System Training Devices - Eng Dev	05	42,604	30,912			30,912 U
131 0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	208,965	33,502			33,502 U
132 0604742A	Constructive Simulation Systems Development	05	21,354	11,636			11,636 U
133 0604746A	Automatic Test Equipment Development	05	10,104	10,915			10,915 U
134 0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	8,423	7,801			7,801 U
135 0604768A	Brilliant Anti-Armor Submunition (BAT)	05	6,568	20,000			20,000 U
136 0604780A	Combined Arms Tactical Trainer (CATT) Core	05	20,514	9,241			9,241 U
137 0604798A	Brigade Analysis, Integration and Evaluation	05	48,030	38,303			38,303 U
138 0604802A	Weapons and Munitions - Eng Dev	05	173,713	186,323			186,323 U
139 0604804A	Logistics and Engineer Equipment - Eng Dev	05	70,096	107,826			107,826 U
140 0604805A	Command, Control, Communications Systems - Eng Dev	05	15,366	12,595			12,595 U
141 0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05	45,054	48,264			48,264 U
142 0604808A	Landmine Warfare/Barrier - Eng Dev	05	39,261	37,108			37,108 U
143 0604818A	Army Tactical Command & Control Hardware & Software	05	163,229	129,974			129,974 U
144 0604820A	Radar Development	05	37,847	95,720			95,720 U

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130 0604715A	Non-System Training Devices - Eng Dev	05	28,036				28,036	U
131 0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	43,651		27,000	27,000	70,651	U
132 0604742A	Constructive Simulation Systems Development	05	10,150				10,150	U
133 0604746A	Automatic Test Equipment Development	05	5,578				5,578	U
134 0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	7,892				7,892	U
135 0604768A	Brilliant Anti-Armor Submunition (BAT)	05	24,975				24,975	U
136 0604780A	Combined Arms Tactical Trainer (CAT) Core	05	3,568				3,568	U
137 0604798A	Brigade Analysis, Integration and Evaluation	05	19,268				19,268	U
138 0604802A	Weapons and Munitions - Eng Dev	05	265,811				265,811	U
139 0604804A	Logistics and Engineer Equipment - Eng Dev	05	49,694				49,694	U
140 0604805A	Command, Control, Communications Systems - Eng Dev	05	11,079				11,079	U
141 0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05	49,870				49,870	U
142 0604808A	Landmine Warfare/Barrier - Eng Dev	05	9,589				9,589	U
143 0604818A	Army Tactical Command & Control Hardware & Software	05	162,513				162,513	U
144 0604820A	Radar Development	05	109,259				109,259	U

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145 0604822A	General Fund Enterprise Business System (GFEBES)	05	35,468	42,883			42,883 U
146 0604823A	Firefinder	05	25,856	17,294			17,294 U
147 0604827A	Soldier Systems - Warrior Dem/Val	05	10,044	4,803			4,803 U
148 0604852A	Suite of Survivability Enhancement Systems - EMD	05	50,380	85,198			85,198 U
149 0604854A	Artillery Systems - EMD	05	1,722	10,732			10,732 U
150 0605013A	Information Technology Development	05	74,551	88,689			88,689 U
151 0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	158,807	102,073			102,073 U
152 0605028A	Armored Multi-Purpose Vehicle (AMPV)	05	107,521	83,830			83,830 U
153 0605029A	Integrated Ground Security Surveillance Response Capability (IGSSR-C)	05	3,104	6,699			6,699 U
154 0605030A	Joint Tactical Network Center (JTNC)	05	15,287	15,882			15,882 U
155 0605031A	Joint Tactical Network (JTN)	05	42,134	40,808			40,808 U
156 0605032A	TRACTOR TIRE	05	107,926				U
157 0605033A	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	05	4,980	3,847			3,847 U
158 0605034A	Tactical Security System (TSS)	05	4,326	6,928			6,928 U
159 0605035A	Common Infrared Countermeasures (CIRCM)	05	32,025	23,179			23,179 U
160 0605036A	Combating Weapons of Mass Destruction (CWMD)	05	10,883	10,000			10,000 U

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145 0604822A	General Fund Enterprise Business System (GFEBs)	05	21,201				21,201	U
146 0604823A	Firefinder	05	20,008				20,008	U
147 0604827A	Soldier Systems - Warrior Dem/Val	05	6,534				6,534	U
148 0604852A	Suite of Survivability Enhancement Systems - EMD	05	82,459				82,459	U
149 0604854A	Artillery Systems - EMD	05	11,611				11,611	U
150 0605013A	Information Technology Development	05	142,678				142,678	U
151 0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	115,286				115,286	U
152 0605028A	Armored Multi-Purpose Vehicle (AMPV)	05	96,594				96,594	U
153 0605029A	Integrated Ground Security Surveillance Response Capability (IGSSR-C)	05						U
154 0605030A	Joint Tactical Network Center (JTNC)	05	16,264				16,264	U
155 0605031A	Joint Tactical Network (JTN)	05	31,696				31,696	U
156 0605032A	TRACTOR TIRE	05						U
157 0605033A	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	05	5,976				5,976	U
158 0605034A	Tactical Security System (TSS)	05						U
159 0605035A	Common Infrared Countermeasures (CIRCM)	05	23,321		2,300	2,300	25,621	U
160 0605036A	Combating Weapons of Mass Destruction (CWMD)	05						U

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161 0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05	14,517	6,054			6,054 U
162 0605041A	Defensive CYBER Tool Development	05	33,796	50,662			50,662 U
163 0605042A	Tactical Network Radio Systems (Low-Tier)	05	18,761	28,404			28,404 U
164 0605047A	Contract Writing System	05	40,341	17,082			17,082 U
165 0605049A	Missile Warning System Modernization (MWSM)	05	7,321	1,539			1,539 U
166 0605051A	Aircraft Survivability Development	05	56,067	55,057		77,420	132,477 U
167 0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	92,674	194,366			194,366 U
168 0605053A	Ground Robotics	05	65,311	26,104			26,104 U
169 0605054A	Emerging Technology Initiatives	05	46,451	37,696			37,696 U
170 0605145A	Medical Products and Support Systems Development	05					0 U
171 0605203A	Army System Development & Demonstration	05	15,379	164,883		19,527	184,410 U
172 0605205A	Small Unmanned Aerial Vehicle (SUAV) (6.5)	05					0 U
173 0605380A	AMF Joint Tactical Radio System (JTRS)	05					0 U
174 0605450A	Joint Air-to-Ground Missile (JAGM)	05	12,440	6,585			6,585 U
175 0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	318,850	208,638			208,638 U

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161 0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05	4,846				4,846	U
162 0605041A	Defensive CYBER Tool Development	05	28,544				28,544	U
163 0605042A	Tactical Network Radio Systems (Low-Tier)	05	28,178				28,178	U
164 0605047A	Contract Writing System	05	22,860				22,860	U
165 0605049A	Missile Warning System Modernization (MWSM)	05						U
166 0605051A	Aircraft Survivability Development	05	35,893	64,625	64,625	64,625	100,518	U
167 0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	235,770				235,770	U
168 0605053A	Ground Robotics	05	13,710				13,710	U
169 0605054A	Emerging Technology Initiatives	05	294,739				294,739	U
170 0605145A	Medical Products and Support Systems Development	05	954				954	U
171 0605203A	Army System Development & Demonstration	05	150,201				150,201	U
172 0605205A	Small Unmanned Aerial Vehicle (SUAV) (6.5)	05	5,999				5,999	U
173 0605380A	AMF Joint Tactical Radio System (JTRS)	05						U
174 0605450A	Joint Air-to-Ground Missile (JAGM)	05	8,891				8,891	U
175 0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	193,929				193,929	U

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176 0605625A	Manned Ground Vehicle	05		205,620			205,620 U
177 0605766A	National Capabilities Integration (MIP)	05	12,340	7,835			7,835 U
178 0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05		7,232			7,232 U
179 0605830A	Aviation Ground Support Equipment	05	7,616	1,664			1,664 U
180 0303032A	TROJAN - RH12	05	5,721	3,936			3,936 U
181 0303267A	Auctioned Spectrum Relocation Fund	05	18,381				U
182 0303367A	Spectrum Access Research and Development	05	285				U
183 0304270A	Electronic Warfare Development	05	8,922	15,232		3,200	18,432 U
184 1205117A	Tractor Bears	05	23,170				U
	System Development & Demonstration		3,119,552	2,989,779		100,147	3,089,926
185 0604256A	Threat Simulator Development	06	46,732	42,117			42,117 U
186 0604258A	Target Systems Development	06	31,286	28,327			28,327 U
187 0604759A	Major T&E Investment	06	79,214	146,565			146,565 U
188 0605103A	Rand Arroyo Center	06	19,071	13,113			13,113 U
189 0605301A	Army Kwajalein Atoll	06	237,414	238,691			238,691 U
190 0605326A	Concepts Experimentation Program	06	30,667	36,922			36,922 U
191 0605502A	Small Business Innovative Research	06	303,386				U
192 0605601A	Army Test Ranges and Facilities	06	311,027	336,468			336,468 U

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176 0605625A	Manned Ground Vehicle	05	327,732				327,732	U
177 0605766A	National Capabilities Integration (MIP)	05	7,670				7,670	U
178 0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05	1,742				1,742	U
179 0605830A	Aviation Ground Support Equipment	05	1,467				1,467	U
180 0303032A	TROJAN - RH12	05	3,451				3,451	U
181 0303267A	Auctioned Spectrum Relocation Fund	05						U
182 0303367A	Spectrum Access Research and Development	05						U
183 0304270A	Electronic Warfare Development	05	55,855		3,900	3,900	59,755	U
184 1205117A	Tractor Bears	05						U
	System Development & Demonstration		3,199,798		97,825	97,825	3,297,623	
185 0604256A	Threat Simulator Development	06	14,515				14,515	U
186 0604258A	Target Systems Development	06	10,668				10,668	U
187 0604759A	Major T&E Investment	06	106,270				106,270	U
188 0605103A	Rand Arroyo Center	06	13,481				13,481	U
189 0605301A	Army Kwajalein Atoll	06	231,824				231,824	U
190 0605326A	Concepts Experimentation Program	06	54,898				54,898	U
191 0605502A	Small Business Innovative Research	06						U
192 0605601A	Army Test Ranges and Facilities	06	350,359				350,359	U

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193 0605602A	Army Technical Test Instrumentation and Targets	06	82,617	61,974			61,974 U
194 0605604A	Survivability/Lethality Analysis	06	39,886	35,075			35,075 U
195 0605606A	Aircraft Certification	06	3,796	3,461			3,461 U
196 0605702A	Meteorological Support to RDT&E Activities	06	9,495	6,233			6,233 U
197 0605706A	Matériel Systems Analysis	06	21,043	21,342			21,342 U
198 0605709A	Exploitation of Foreign Items	06	15,026	11,168			11,168 U
199 0605712A	Support of Operational Testing	06	52,139	52,723			52,723 U
200 0605716A	Army Evaluation Center	06	56,532	60,815			60,815 U
201 0605718A	Army Modeling & Sim X-Cmd Collaboration & Integ	06	2,708	2,527			2,527 U
202 0605801A	Programwide Activities	06	60,218	58,175			58,175 U
203 0605803A	Technical Information Activities	06	28,237	30,060			30,060 U
204 0605805A	Munitions Standardization, Effectiveness and Safety	06	66,678	54,458			54,458 U
205 0605857A	Environmental Quality Technology Mgmt Support	06	3,138	4,681			4,681 U
206 0605898A	Army Direct Report Headquarters - R&D - MHA	06	53,526	53,820			53,820 U
207 0606001A	Military Ground-Based CREW Technology	06	4,241	2,141			2,141 U
208 0606002A	Ronald Reagan Ballistic Missile Defense Test Site	06	60,808	62,069			62,069 U

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193 0605602A	Army Technical Test Instrumentation and Targets	06	48,475				48,475	U
194 0605604A	Survivability/Lethality Analysis	06	36,001				36,001	U
195 0605606A	Aircraft Certification	06	2,736				2,736	U
196 0605702A	Meteorological Support to RDT&E Activities	06	6,488				6,488	U
197 0605706A	Materiel Systems Analysis	06	21,859				21,859	U
198 0605709A	Exploitation of Foreign Items	06	7,936		1,000	1,000	8,936	U
199 0605712A	Support of Operational Testing	06	54,470				54,470	U
200 0605716A	Army Evaluation Center	06	63,141				63,141	U
201 0605718A	Army Modeling & Sim X-Cmd Collaboration & Integ	06	2,572				2,572	U
202 0605801A	Programwide Activities	06	87,472				87,472	U
203 0605803A	Technical Information Activities	06	26,244				26,244	U
204 0605805A	Munitions Standardization, Effectiveness and Safety	06	40,133				40,133	U
205 0605857A	Environmental Quality Technology Mgmt Support	06	1,780				1,780	U
206 0605898A	Army Direct Report Headquarters - R&D - MHA	06	55,045				55,045	U
207 0606001A	Military Ground-Based CREW Technology	06						U
208 0606002A	Ronald Reagan Ballistic Missile Defense Test Site	06	71,306				71,306	U



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209 0606003A	CounterIntel and Human Intel Modernization	06	2,636	1,050		1,875	2,925 U
210 0606105A	Medical Program-Wide Activities	06					U
211 0606942A	Assessments and Evaluations Cyber Vulnerabilities	06	88,300	4,500			4,500 U
212 0909980A	Judgment Fund Reimbursement	06	122				U
213 0909999A	Financing for Cancelled Account Adjustments	06	236				U
	Management Support		1,710,179	1,368,475		1,875	1,370,350
214 0603778A	MLRS Product Improvement Program	07	6,574	14,615			14,615 U
215 0603813A	TRACTOR PULL	07	4,067				U
216 0605024A	Anti-Tamper Technology Support	07	7,159	8,491			8,491 U
217 0607131A	Weapons and Munitions Product Improvement Programs	07	17,992	15,645			15,645 U
218 0607133A	TRACTOR SMOKE	07	12,357				U
219 0607134A	Long Range Precision Fires (LRPF)	07	152,573	156,682			156,682 U
220 0607135A	Apache Product Improvement Program	07	22,914				U
221 0607136A	Blackhawk Product Improvement Program	07	33,906	23,039			23,039 U
222 0607137A	Chinook Product Improvement Program	07	139,003	171,471			171,471 U
223 0607138A	Fixed Wing Product Improvement Program	07	2,146				U
224 0607139A	Improved Turbine Engine Program	07	173,766	206,434			206,434 U

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209 0606003A	CounterIntel and Human Intel Modernization	06	1,063		4,137	4,137	5,200	U
210 0606105A	Medical Program-Wide Activities	06	19,891				19,891	U
211 0606942A	Assessments and Evaluations Cyber Vulnerabilities	06	4,496				4,496	U
212 0909980A	Judgment Fund Reimbursement	06						U
213 0909999A	Financing for Cancelled Account Adjustments	06						U
	Management Support		1,333,123		5,137	5,137	1,338,260	
214 0603778A	MLRS Product Improvement Program	07	10,157				10,157	U
215 0603813A	TRACTOR PULL	07						U
216 0605024A	Anti-Tamper Technology Support	07	8,682				8,682	U
217 0607131A	Weapons and Munitions Product Improvement Programs	07	20,409				20,409	U
218 0607133A	TRACTOR SMOKE	07						U
219 0607134A	Long Range Precision Fires (LRPF)	07	122,733				122,733	U
220 0607135A	Apache Product Improvement Program	07						U
221 0607136A	Blackhawk Product Improvement Program	07	11,236				11,236	U
222 0607137A	Chinook Product Improvement Program	07	46,091				46,091	U
223 0607138A	Fixed Wing Product Improvement Program	07						U
224 0607139A	Improved Turbine Engine Program	07	249,257				249,257	U

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225 0607142A	Aviation Rocket System Product Improvement and Development	07	35,211	1,927			1,927 U
226 0607143A	Unmanned Aircraft System Universal Products	07	36,488	18,132			18,132 U
227 0607145A	Apache Future Development	07		5,448			5,448 U
228 0607150A	Intel Cyber Development	07					0 U
229 0607312A	Army Operational Systems Development	07		45,026			45,026 U
230 0607665A	Family of Biometrics	07	2,320	1,702			1,702 U
231 0607865A	Patriot Product Improvement	07	72,895	87,430			87,430 U
232 0203728A	Joint Automated Deep Operation Coordination System (JADOCs)	07	29,782	47,398			47,398 U
233 0203735A	Combat Vehicle Improvement Programs	07	321,513	277,633			277,633 U
234 0203743A	155mm Self-Propelled Howitzer Improvements	07	35,681	199,274			199,274 U
235 0203744A	Aircraft Modifications/Product Improvement Programs	07	13,629	9,278			9,278 U
236 0203752A	Aircraft Engine Component Improvement Program	07	146	144			144 U
237 0203758A	Digitization	07	6,077	5,270			5,270 U
238 0203801A	Missile/Air Defense Product Improvement Program	07	3,588	1,287			1,287 U
239 0203802A	Other Missile Product Improvement Programs	07	4,760				0 U
240 0203808A	TRACTOR CARD	07	34,050				0 U

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225	0607142A	Aviation Rocket System Product Improvement and Development	07	17,155				17,155	U
226	0607143A	Unmanned Aircraft System Universal Products	07	7,743				7,743	U
227	0607145A	Apache Future Development	07	77,177				77,177	U
228	0607150A	Intel Cyber Development	07	14,652				14,652	U
229	0607312A	Army Operational Systems Development	07	35,851				35,851	U
230	0607665A	Family of Biometrics	07	1,324				1,324	U
231	0607865A	Patriot Product Improvement	07	187,840				187,840	U
232	0203728A	Joint Automated Deep Operation Coordination System (JADOCs)	07	44,691				44,691	U
233	0203735A	Combat Vehicle Improvement Programs	07	268,919				268,919	U
234	0203743A	155mm Self-Propelled Howitzer Improvements	07	427,254				427,254	U
235	0203744A	Aircraft Modifications/Product Improvement Programs	07	11,688				11,688	U
236	0203752A	Aircraft Engine Component Improvement Program	07	80				80	U
237	0203758A	Digitization	07	4,516				4,516	U
238	0203801A	Missile/Air Defense Product Improvement Program	07	1,288				1,288	U
239	0203802A	Other Missile Product Improvement Programs	07	79,424		2,300	2,300	81,724	U
240	0203808A	TRACTOR CARD	07						U

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 Total Obligational Authority  
 (Dollars in Thousands)

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Appropriation: 2040A Research, Development, Test & Eval, Army

Program Line Element No	Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted (Base+Emerg+ OCO)
241 0205402A	Integrated Base Defense - Operational System Dev	07	8,000				U
242 0205410A	Materials Handling Equipment	07	1,132				U
243 0205412A	Environmental Quality Technology - Operational System Dev	07	249	10,000			10,000 U
244 0205456A	Lower Tier Air and Missile Defense (AMD) System	07	74,295	97,746			97,746 U
245 0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07	113,471	117,294			117,294 U
246 0208053A	Joint Tactical Ground System	07					U
248 0303028A	Security and Intelligence Activities	07	40,002	13,845		12,904	26,749 U
249 0303140A	Information Systems Security Program	07	40,148	25,710			25,710 U
250 0303141A	Global Combat Support System	07	51,415	60,076			60,076 U
251 0303142A	SATCOM Ground Environment (SPACE)	07					U
252 0303150A	WWMCCS/Global Command and Control System	07	1,966	2,073			2,073 U
255 0305172A	Combined Advanced Applications	07	1,500				U
256 0305179A	Integrated Broadcast Service (IBS)	07	450	459			459 U
257 0305204A	Tactical Unmanned Aerial Vehicles	07	6,000	5,097		17,050	22,147 U
258 0305206A	Airborne Reconnaissance Systems	07	26,416	11,177		2,000	13,177 U
259 0305208A	Distributed Common Ground/Surface Systems	07	27,109	28,821			28,821 U
260 0305219A	MQ-1C Gray Eagle UAS	07		5,000			5,000 U

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 (Dollars in Thousands)

17 Jan 2020

Appropriation: 2040A Research, Development, Test & Eval, Army

Program Line Element No	Item	Act	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)	U C
241 0205402A	Integrated Base Defense - Operational System Dev	07						U
242 0205410A	Materials Handling Equipment	07						U
243 0205412A	Environmental Quality Technology - Operational System Dev	07	259				259	U
244 0205456A	Lower Tier Air and Missile Defense (AMD) System	07	166				166	U
245 0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07	75,575				75,575	U
246 0208053A	Joint Tactical Ground System	07	9,510				9,510	U
248 0303028A	Security and Intelligence Activities	07		23,367		23,367	23,367	U
249 0303140A	Information Systems Security Program	07	29,270				29,270	U
250 0303141A	Global Combat Support System	07	86,908				86,908	U
251 0303142A	SATCOM Ground Environment (SPACE)	07	18,684				18,684	U
252 0303150A	WWMCCS/Global Command and Control System	07						U
255 0305172A	Combined Advanced Applications	07						U
256 0305179A	Integrated Broadcast Service (IBS)	07	467				467	U
257 0305204A	Tactical Unmanned Aerial Vehicles	07	4,051		34,100	34,100	38,151	U
258 0305206A	Airborne Reconnaissance Systems	07	13,283		15,575	15,575	28,858	U
259 0305208A	Distributed Common Ground/Surface Systems	07	47,204				47,204	U
260 0305219A	MQ-1C Gray Eagle UAS	07						U

Department of the Army  
 FY 2021 President's Budget  
 Exhibit R-1 FY 2021 President's Budget  
 Total Obligational Authority  
 (Dollars in Thousands)

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Appropriation: 2040A Research, Development, Test & Eval, Army

Program Line Element No	Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted (Base+Emerg+ OCO)	
261	0305232A RQ-11 UAV	07	6,180	3,218			3,218	U
262	0305233A RQ-7 UAV	07	17,863	7,817			7,817	U
263	0307665A Biometrics Enabled Intelligence	07	6,524	2,000		2,214	4,214	U
264	0708045A End Item Industrial Preparedness Activities	07	106,766	108,348			108,348	U
265	1203142A SATCOM Ground Environment (SPACE)	07	9,927	34,169			34,169	U
266	1208053A Joint Tactical Ground System	07	7,400	7,677			7,677	U
9999	9999999999 Classified Programs		5,955	7,273			7,273	U
	Operational Systems Development		1,721,365	1,844,126		34,168	1,878,294	U
267	0608041A Defensive CYBER - Software Prototype Development	08						U
	Software and Digital Technology Pilot Program							
Total Research, Development, Test & Eval, Army			11,371,268	12,543,435		147,304	12,690,739	

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Appropriation: 2040A Research, Development, Test & Eval, Army

Program Line Element No	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 c
261	0305232A RQ-11 UAV	07						U
262	0305233A RQ-7 UAV	07						U
263	0307665A Biometrics Enabled Intelligence	07						U
264	0708045A End Item Industrial Preparedness Activities	07	61,012				61,012	U
265	1203142A SATCOM Ground Environment (SPACE)	07						U
266	1208053A Joint Tactical Ground System	07						U
9999	9999999999 Classified Programs		3,983				3,983	U
	Operational Systems Development		1,998,539		75,342	75,342	2,073,881	
267	0608041A Defensive CYBER - Software Prototype Development	08	46,445				46,445	U
	Software and Digital Technology Pilot Program		46,445				46,445	
Total Research, Development, Test & Eval, Army			12,587,343		182,824	182,824	12,770,167	



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225	07	0607142A	Aviation Rocket System Product Improvement and Development.....	124
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233	07	0203735A	Combat Vehicle Improvement Programs.....	196
234	07	0203743A	155mm Self-Propelled Howitzer Improvements.....	237
235	07	0203744A	Aircraft Modifications/Product Improvement Programs.....	245
236	07	0203752A	Aircraft Engine Component Improvement Program.....	253
237	07	0203758A	Digitization.....	261
238	07	0203801A	Missile/Air Defense Product Improvement Program.....	270
239	07	0203802A	Other Missile Product Improvement Programs.....	278
240	07	0203808A	TRACTOR CARD.....	301
241	07	0205402A	Integrated Base Defense - Operational System Dev.....	305
242	07	0205410A	Materials Handling Equipment.....	312
243	07	0205412A	Environmental Quality Technology - Operational System Dev.....	317
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258	07	0305206A	Airborne Reconnaissance Systems.....	475
259	07	0305208A	Distributed Common Ground/Surface Systems.....	502
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261	07	0305232A	RQ-11 UAV.....	519
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263	07	0307665A	Biometrics Enabled Intelligence.....	537
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Fixed Wing Product Improvement Program	0607138A	223	07.....	107
Global Combat Support System	0303141A	250	07.....	409
Guided Multiple-Launch Rocket System (GMLRS)	0205778A	245	07.....	331
Improved Turbine Engine Program	0607139A	224	07.....	114
Information Systems Security Program	0303140A	249	07.....	370
Integrated Base Defense - Operational System Dev	0205402A	241	07.....	305
Integrated Broadcast Service (IBS)	0305179A	256	07.....	452
Intel Cyber Development	0607150A	228	07.....	146
Joint Automated Deep Operation Coordination System (JADOCS)	0203728A	232	07.....	179
Joint Tactical Ground System	0208053A	246	07.....	348
Joint Tactical Ground System	1208053A	266	07.....	598
Long Range Precision Fires (LRPF)	0607134A	219	07.....	64
Lower Tier Air and Missile Defense (AMD) System	0205456A	244	07.....	323
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MQ-1 Gray Eagle UAV	0305219A	260	07.....	514
Materials Handling Equipment	0205410A	242	07.....	312
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Patriot Product Improvement	0607865A	231	07.....	167
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RQ-7 UAV	0305233A	262	07.....	529
SATCOM Ground Environment (SPACE)	0303142A	251	07.....	426
SATCOM Ground Environment (SPACE)	1203142A	265	07.....	570
Security and Intelligence Activities	0303028A	248	07.....	357
TRACTOR CARD	0203808A	240	07.....	301
TRACTOR PULL	0603813A	215	07.....	18
TRACTOR SMOKE	0607133A	218	07.....	63
Tactical Unmanned Aerial Vehicles	0305204A	257	07.....	458
Unmanned Aircraft System Universal Products	0607143A	226	07.....	133
WWMCCS/Global Command and Control System	0303150A	252	07.....	443
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**Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program
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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	-	6.574	14.615	10.157	-	10.157	12.467	35.514	33.997	35.685	0.000	149.009
093: Multi-Launch Rocket System (MLRS)	-	3.784	6.563	5.036	-	5.036	5.035	31.476	29.791	31.479	0.000	113.164
DX8: HIMARS Product Improvement Program	-	2.790	8.052	5.121	-	5.121	7.432	4.038	4.206	4.206	0.000	35.845

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

Program element (PE) 0603778A MLRS Product Improvement Program supports development and testing of the Army's rocket launcher fleet, including the Multiple Launch Rocket System (MLRS) launcher and the High Mobility Artillery Rocket System (HIMARS) launcher. MLRS and HIMARS launchers support the Army's number one priority modernization effort, Long Range Precision Fires. Updated launchers are required to fire current and future munitions such as the Precision Strike Missile (PrSM) and Extended Range (ER) Guided Multiple Launch Rocket System (GMLRS). Funding from both Projects 093 and DX8 contributes to common efforts between both launcher platforms such as Assured Positioning, Navigation and Timing (APNT) integration and rocket launcher software development effort by Combat Capabilities Development Command Aviation and Missile Center (CCDC AvMC). The goal is to develop common solutions applicable to both MLRS and HIMARS launchers.

Project 093 M270A1 MLRS launcher is a full-spectrum, combat-proven, all-weather, 24/7 lethal and responsive, precision strike weapon system. MLRS provides critical missile precision strike, operational shaping fires, counterfire, and close support destructive and suppressive fires. MLRS is a tracked, indirect fire, rocket/missile launcher capable of firing two pods of precision rockets/missiles from the current MLRS Family of Munitions (MFOM) to include the Guided Multiple Launch Rocket System-Unitary (GMLRS-U), GMLRS-Alternative Warhead, the Army Tactical Missile System (ATACMS) and future MFOM to include the ER GMLRS, and the Precision Strike Missile (PrSM). Funds software development, training updates, Assured Positioning, Navigation and Timing (APNT) technology implementation, integration of satellite communications, and nonrecurring engineering for the MLRS launcher. Funds development related to maintaining capability associated with the current and evolving threat. Funding in FY 2023-2025 also funds non-recurring engineering for system hardware and software modernization to the MLRS chassis, Launcher Loader Module, and Fire Control System. Funding from both Projects 093 and DX8 contributes to common efforts between both launcher platforms such as APNT integration and rocket launcher software development effort by CCDC AvMC. The goal is to develop common solutions applicable to both MLRS and HIMARS launchers.

**Justification:**

Fiscal Year (FY) 2021 Base funding in the amount of \$5.036 million for Project 093 continues tactical launcher software development, qualification, and materiel release to support the Fire Control System (FCS) electronic obsolescence mitigation hardware upgrade required to operate a MLRS launcher. The tactical software is a critical developmental item required to field additional launchers, maintain backward compatibility for current fleet sustainment, and is the first release of government developed software common to both the MLRS and HIMARS launcher. The FY 2021 funds also allow additional integration of Assured Positioning, Navigation and Timing (APNT) capabilities, and integration of satellite communications, allowing the MLRS to continue to effectively operate in near peer and peer threat environments.

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603778A / <i>MLRS Product Improvement Program</i>
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Project DX8 M142 High Mobility Artillery Rocket System (HIMARS) launcher is a full-spectrum, combat-proven, all-weather, 24/7 lethal and responsive, precision strike weapon system. HIMARS provides critical missile precision strike, operational shaping fires, counterfire, and close support destructive and suppressive fires. HIMARS is a C-130 or C-17 transportable, wheeled, indirect fire, rocket/missile launcher capable of firing one pod of precision rockets/missiles from the current and emerging MLRS MFOM, to include the GMLRS-U, GMLRS-Alternative Warhead, the ATACMS and future MFOM to include the ER GMLRS, and the PrSM. Funds software development, training updates, APNT technology implementation, integration of satellite communications, and nonrecurring engineering for the HIMARS launcher. Funds development related to maintaining capability associated with the current and evolving threat. Funding from both Projects 093 and DX8 contributes to common efforts between both launcher platforms such as APN integration and rocket launcher software development effort by CCDC AvMC. The goal is to develop common solutions applicable to both MLRS and HIMARS launchers.

FY 2021 Base funding in the amount of \$5.121 million for Project DX8 supports tactical launcher software development and qualification to support the Fire Control System (FCS) electronic obsolescence mitigation hardware upgrade required to operate a HIMARS launcher. The tactical software is a critical developmental item required to field additional launchers, maintain backward compatibility for current fleet sustainment, and is the first release of government developed software common to both the MLRS and HIMARS launcher. This effort funds research integration of Assured Positioning, Navigation and Timing (APNT) capabilities, and integration of satellite communications, allowing the HIMARS to continue to effectively operate in near peer threat environments.

<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	6.877	22.877	10.167	-	10.167
Current President's Budget	6.574	14.615	10.157	-	10.157
Total Adjustments	-0.303	-8.262	-0.010	-	-0.010
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-8.262			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.303	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.010	-	-0.010

**Change Summary Explanation**

FY 2021: The \$12.720 million decrease in base funding is a result of Army realignment of funds to higher priority programs.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program				<b>Project (Number/Name)</b> 093 / Multi-Launch Rocket System (MLRS)			
<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>
093: Multi-Launch Rocket System (MLRS)	-	3.784	6.563	5.036	-	5.036	5.035	31.476	29.791	31.479	0.000	113.164
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Project 093 M270A1 MLRS launcher is a full-spectrum, combat-proven, all-weather, 24/7 lethal and responsive, precision strike weapon system. MLRS provides critical missile precision strike, operational shaping fires, counterfire, and close support destructive and suppressive fires. MLRS is a tracked, indirect fire, rocket/missile launcher capable of firing two pods of precision rockets/missiles from the current MLRS Family of Munitions (MFOM) to include the Guided Multiple Launch Rocket System-Unitary (GMLRS-U), GMLRS-Alternative Warhead, the Army Tactical Missile System (ATACMS) and future MFOM to include the ER GMLRS, and the Precision Strike Missile (PrSM). Funds software development, training updates, Assured Positioning, Navigation and Timing (APNT) technology implementation, integration of satellite communications, and nonrecurring engineering for the MLRS launcher. Funds development related to maintaining capability associated with the current and evolving threat. Funding in FY 2023-2025 also funds non-recurring engineering for system hardware and software modernization to the MLRS chassis, Launcher Loader Module, and Fire Control System. Funding from both Projects 093 and DX8 contributes to common efforts between both launcher platforms such as APNT integration and rocket launcher software development effort by CCDC AvMC. The goal is to develop common solutions applicable to both MLRS and HIMARS launchers.

**Justification:**

FY 2021 Base funding in the amount of \$5.036 million for Project 093 continues tactical launcher software development, qualification, and materiel release to support the Fire Control System (FCS) electronic obsolescence mitigation hardware upgrade required to operate a MLRS launcher. The tactical software is a critical developmental item required to field additional launchers, maintain backward compatibility for current fleet sustainment, and is the first release of government developed software common to both the MLRS and HIMARS launcher. The FY2021 funds also allow additional integration of Assured Positioning, Navigation and Timing (APNT) capabilities, and integration of satellite communications, allowing the MLRS to continue to effectively operate in near peer and peer threat environments.

**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> MLRS Product Improvement Program	3.625	6.265	5.036	-	5.036
<b>Description:</b> The M270A1 MLRS Product Improvement Program provides the preservation of platform viability and readiness to accept technology insertion as capability enhancements are developed and to mitigate obsolescence. Support efforts include: electronic obsolescence mitigation and enhancements for the M993A1 carrier, Fire Control System, Launcher Loader Module and Enhanced Command and Control; development and updating the Fire Control System software to keep pace with changes to the munitions; and performing Command, Control, Communications, Computers and Intelligence (C4I)/interoperability and Information Assurance compliance certification and network interoperability testing. Perform technical assessments and					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program	<b>Project (Number/Name)</b> 093 / Multi-Launch Rocket System (MLRS)

<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>
concept studies for the following: obsolescence mitigation, APNT, crew protection, automotive and hardware/software enhancements, improving operational timelines and risk reduction.  <b>FY 2020 Plans:</b> Continued tactical launcher software development and qualification to support the FCS electronic obsolescence mitigation hardware upgrade required to operate a MLRS launcher. Conducted research and development of APNT capabilities, and integration of satellite communications.  <b>FY 2021 Base Plans:</b> Will continue updates to currently fielded tactical launcher software. Continue tactical launcher software development to incorporate updates post Functional Qualification and Post System Integration Qualification to support the FCS electronic obsolescence mitigation hardware upgrade required to operate a MLRS launcher. Conduct a demonstration for APNT capabilities.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decreased funding of \$1.527 million delays the integration of GPS Anti-Jam and Anti-Spoofing capabilities, and integration of satellite communications by one year. This limits the MLRS Launcher's ability to continue effective operations in near-peer threat environment.					
<b>Title:</b> FY 2019 SIBR/STTR Transfer <b>Description:</b> Account for the FY 2019 SBIR / STTR Adjustment	0.159	-	-	-	-
<b>Title:</b> FY 2020 SBIR/STTR Transfer <b>Description:</b> Funding transferred in accordance with Title 15 USC ?638  <b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638	-	0.298	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	3.784	6.563	5.036	-	5.036

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program	<b>Project (Number/Name)</b> 093 / Multi-Launch Rocket System (MLRS)

**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>
• C67500: MLRS Mods	478.998	372.550	310.419	20.000	330.419	277.623	207.159	165.712	165.062	Continuing	Continuing

**Remarks**

C67500 is Budget Line Item Number (BLIN) 22 funded in the Missiles Procurement Army appropriation.

**D. Acquisition Strategy**

The M270A1 MLRS Product Improvement Program performs development efforts required to address emerging requirements. Emerging requirements include, but are not limited to, updates to address emerging threats to the launcher organic version 8.x software, reacting to system changes driven by policy and emerging requirements, and maintaining architectural compatibility with other Army ground based systems reducing sustainability costs. Update software and hardware for fire control system, communications, and munitions to maintain compatibility and operational viability against near-peer adversaries.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program	<b>Project (Number/Name)</b> 093 / Multi-Launch Rocket System (MLRS)
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<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>			
Government Program Management	Various	PFRMS Project Office : Redstone Arsenal, AL	8.955	-		-		-		-		-	0.000	8.955	-
FY 2019 SBIR / STTR	Various	Various : Various	-	0.159		0.084		-		-		-	0.000	0.243	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.298		-		-		-	0.000	0.298	-
<b>Subtotal</b>			8.955	0.159		0.382		-		-		-	0.000	9.496	N/A

**Remarks**  
Government Program Management funding was transferred to the Operations and Maintenance, Army (OMA) appropriation.

<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>			
Other Government Agencies OGA	MIPR	FT SILL OK, CECOM-NJ AMRDEC-RSA AL, : various	17.108	-		-		-		-		-	0.000	17.108	-
MLRS IAC	C/CPFF	Lockheed Martin : Grand Prairie, TX	30.498	-		-		-		-		-	0.000	30.498	-
MLRS FCS Development	SS/CR	Lockheed Martin : Grand Prairie, TX	70.200	-		-		-		-		-	0.000	70.200	-
Organic Software Development	MIPR	CCDC AvMC : Redstone Arsenal, AL	5.760	3.625	May 2019	4.831	Dec 2019	5.036	Dec 2020	-		5.036	Continuing	Continuing	Continuing
Risk Reduction Effort: Common Fire Control System	SS/CR	Lockheed Martin : Grand Prairie, TX	21.900	-		-		-		-		-	0.000	21.900	-
Risk Reduction Effort: Hulls	MIPR	Red River Army Depot : Red River Army Depot, TX	3.200	-		-		-		-		-	0.000	3.200	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program	<b>Project (Number/Name)</b> 093 / Multi-Launch Rocket System (MLRS)
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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			
Assured Position, Navigation and Timing (APNT) Demonstration	MIPR	CCDC AvMC : Redstone Arsenal, AL	-	-		0.176		-		-		-	0.000	0.176	-
<b>Subtotal</b>			148.666	3.625		5.007		5.036		-		5.036	Continuing	Continuing	N/A

**Remarks**  
Organic (government developed, maintained, and owned) software development includes additional research and development related to Fire Control System electronic obsolescence, Assured Position, Navigation and Timing (APNT) activities such as Global Positioning System (GPS) Anti-Jam, Anti-Spoofing capabilities, and integration of satellite communications.

<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 Contract	Various	Multiple : Multiple	4.834	-		-		-		-		-	0.000	4.834	-
<b>Subtotal</b>			4.834	-		-		-		-		-	0.000	4.834	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 Support, Joint Interoperability Test Certificate	MIPR	CTSF, Ft. Hood : Texas	10.712	-		-		-		-		-	0.000	10.712	-
Test Support	MIPR	Ft Hood, TX, ATEC, APG, MD, WSMR, RTC, : RSA: Various	-	-		1.174	Nov 2019	-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			10.712	-		1.174		-		-		-	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>			173.167	3.784	6.563	5.036	-	5.036	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Army						<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 2040 / 7			<b>R-1 Program Element (Number/Name)</b> PE 0603778A / <i>MLRS Product Improvement Program</i>			<b>Project (Number/Name)</b> 093 / <i>Multi-Launch Rocket System (MLRS)</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**  
 Acronyms:  
 AvMC: Aviation and Missile Center;  
 CCDC: Combat Capabilities Development Command;  
 AMRDEC - Aviation and Missile Research Development and Engineering Center;  
 PFRMS - Precision Fires Rocket and Missile Systems (former name for PM STORM);  
 STORM - Strategic and Operational Rocket and Missile Systems (new name for PM PFRMS);  
 CTSF - Central Technical Support Facility;  
 ATEC - US Army Test and Evaluation Command;  
 APG MD - Aberdeen Proving Ground, Maryland;  
 WSMR - White Sands Missile Range;  
 RTC RSA - Redstone Test Center, Redstone Arsenal, Alabama



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date: February 2020</b>		
<b>Appropriation/Budget Activity</b> 2040 / 7		<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program		<b>Project (Number/Name)</b> 093 / Multi-Launch Rocket System (MLRS)	

Event Name	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
Software Development	[Blue bar]																											
Software Qualification	[Grey bar]																											
Post System Integration Qualification	[Grey bar]																											
Functional Configuration Audit	[Grey bar]																											
Delta Live Fire Testing for Improved Armored Cab (IAC)	[Grey bar]																											
GPS Anti-Jam/Anti-Spoofing Integration	[Grey bar]																											
GPS Anti-Jam/Anti-Spoof Demonstration	[Grey bar]																											
Launcher Modernization	[Blue bar]																											
System Requirements Review	[Grey bar]																											
System Functional Review	[Grey bar]																											
Preliminary Design Review	[Grey bar]																											
Critical Design Review	[Grey bar]																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603778A / <i>MLRS Product Improvement Program</i>	<b>Project (Number/Name)</b> 093 / <i>Multi-Launch Rocket System (MLRS)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Software Development	1	2018	4	2025
Software Qualification	3	2020	3	2020
Post System Integration Qualification	1	2021	3	2021
Functional Configuration Audit	2	2022	2	2022
Delta Live Fire Testing for Improved Armored Cab (IAC)	3	2020	3	2020
GPS Anti-Jam/Anti-Spoofing Integration	2	2020	2	2020
GPS Anti-Jam/Anti-Spoof Demonstration	2	2021	2	2021
Launcher Modernization	1	2023	4	2025
System Requirements Review	3	2023	3	2023
System Functional Review	1	2024	1	2024
Preliminary Design Review	3	2024	3	2024
Critical Design Review	3	2025	3	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program				<b>Project (Number/Name)</b> DX8 / HIMARS Product Improvement Program			
<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>
DX8: HIMARS Product Improvement Program	-	2.790	8.052	5.121	-	5.121	7.432	4.038	4.206	4.206	0.000	35.845
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Project DX8 M142 High Mobility Artillery Rocket System (HIMARS) launcher is a full-spectrum, combat-proven, all-weather, 24/7 lethal and responsive, precision strike weapon system. HIMARS provides critical missile precision strike, operational shaping fires, counterfire, and close support destructive and suppressive fires. HIMARS is a C-130 or C-17 transportable, wheeled, indirect fire, rocket/missile launcher capable of firing one pod of precision rockets/missiles from the current and emerging MLRS MFOM, to include the GMLRS-U, GMLRS-Alternative Warhead, the ATACMS and future MFOM to include the ER GMLRS, and the PrSM. Funds software development, training updates, APNT technology implementation, integration of satellite communications, and nonrecurring engineering for the HIMARS launcher. Funds development related to maintaining capability associated with the current and evolving threat. Funding from both Projects 093 and DX8 contributes to common efforts between both launcher platforms such as Assured Positioning, Navigation and Timing (APNT) integration and rocket launcher software development effort by CCDC AvMC. The goal is to develop common solutions applicable to both MLRS and HIMARS launchers.

**Justification:**

FY 2021 Base funding in the amount of \$5.121 million for Project DX8 supports tactical launcher software development and qualification to support the Fire Control System (FCS) electronic obsolescence mitigation hardware upgrade required to operate a HIMARS launcher. The tactical software is a critical developmental item required to field additional launchers, maintain backward compatibility for current fleet sustainment, and is the first release of government developed software common to both the MLRS and HIMARS launcher. This effort funds research integration of Assured Positioning, Navigation and Timing (APNT) capabilities, and integration of satellite communications, allowing the HIMARS to continue to effectively operate in near peer threat environments.

**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> MLRS Production Improvement Program (PIP)-HIMARS PIP	2.790	7.686	5.121	-	5.121
<b>Description:</b> The HIMARS Product Improvement Program provides the preservation of platform viability and readiness to accept technology insertion. As capability enhancements are developed, technology is inserted in order to mitigate obsolescence. Support efforts include: obsolescence mitigation and enhancements for the truck, Fire Control System, Launcher Loader Module and Enhanced Command and Control; development and updating the Fire Control System software to keep pace with changes to the munitions; and performing Command, Control, Communications, Computers and Intelligence (C4I)/interoperability and Information Assurance compliance certification and network interoperability testing. Perform technical assessments and concept studies for the following: electronic obsolescence mitigation and redesign to keep pace with the evolving					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program	<b>Project (Number/Name)</b> DX8 / HIMARS Product Improvement Program

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>threat, APNT, crew protection, automotive and hardware/software enhancements, improving operational timelines, and risk reduction.</p> <p><b>FY 2020 Plans:</b> Continued tactical launcher software development and qualification to support the FCS electronic obsolescence mitigation hardware upgrade required to operate a HIMARS launcher. Conducted research and development of APNT capabilities, and integration of satellite communications.</p> <p><b>FY 2021 Base Plans:</b> Continue tactical launcher software development, risk reduction, and qualification to support the FCS electronic obsolescence mitigation hardware upgrade required to operate a HIMARS launcher. Integrate APNT capabilities, and integrate satellite communications.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decreased funding of \$1.931million delays integration of APNT capabilities, and integration of satellite communications. This integration allows the HIMARS Launcher to continue effective operations in near-peer threat environments.</p>					
<p><b>Title:</b> FY 2020 SBIR/STTR Transfer</p> <p><b>Description:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638</p>	-	0.366	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	2.790	8.052	5.121	-	5.121

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
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
• C67501: HIMARS Modifications	10.196	12.483	6.081	-	6.081	7.292	9.700	17.402	29.968	Continuing	Continuing
• C02901: High Mobility Artillery Rocket System (HIMARS)	171.138	-	41.226	-	41.226	88.979	41.228	-	-	0.000	342.571

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603778A / <i>MLRS Product Improvement Program</i>	<b>Project (Number/Name)</b> DX8 / <i>HIMARS Product Improvement Program</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**  
C67501 (Budget Line Item Number 23) and C02091 (Budget Line Item Number 13) are funded in the Missiles Procurement Army appropriation.

**D. Acquisition Strategy**

The M142 HIMARS Product Improvement Program performs development efforts required to address emerging requirements. Emerging requirements include, but are not limited to, updates to address emerging threats to the launcher organic version 8.x software, reacting to system changes driven by policy and emerging requirements, and maintaining architectural compatibility with other Army ground based systems reducing sustainability costs. Update software and hardware for fire control system, communications, and munitions to maintain compatibility and operational viability against near-peer adversaries.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program	<b>Project (Number/Name)</b> DX8 / HIMARS Product Improvement Program
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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			
Government Program Management	Various	PFRMS Project Office : Redstone Arsenal, AL	0.817	-		-		0.100		-		0.100	0.000	0.917	-
FY 2019 SBIR / STTR	Various	Various : Various	-	0.144		-		-		-		-	0.000	0.144	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.366		-		-		-	0.000	0.366	-
<b>Subtotal</b>			0.817	0.144		0.366		0.100		-		0.100	0.000	1.427	N/A

**Remarks**  
Government Program Management funding was transferred to the Operations and Maintenance, Army (OMA) appropriation.

<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			
Other Government Agencies (OGA)	MIPR	AMCOM, GSA, RSA : Various	3.318	-		-		-		-		-	0.000	3.318	-
Organic Software Development	MIPR	CCDC AvMC : Redstone Arsenal, AL	11.389	2.546	Apr 2019	6.431	Apr 2020	5.021	Apr 2021	-		5.021	Continuing	Continuing	Continuing
APNT Demonstration	MIPR	CCDC AvMC : Redstone Arsenal, AL	-	-		0.128	Apr 2020	-		-		-	0.000	0.128	-
<b>Subtotal</b>			14.707	2.546		6.559		5.021		-		5.021	Continuing	Continuing	N/A





**Remarks**  
Organic (government developed, maintained, and owned) software development includes additional research and development related to Fire Control System electronic obsolescence, Assured Position, Navigation and Timing (APNT) activities such as Global Positioning System (GPS) Anti-Jam, Anti-Spoofing capabilities, and integration of satellite communications.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>												<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 2040 / 7				<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program				<b>Project (Number/Name)</b> DX8 / HIMARS Product Improvement Program							
<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>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Test Support	MIPR	Ft Hood, TX, ATEC, APG, MD, WSMR, RTC, RSA : Various	3.459	0.100	Jun 2019	1.127	Jun 2020	-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			3.459	0.100		1.127		-		-		-	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>			18.983	2.790	8.052		5.121		-		5.121	Continuing	Continuing	N/A	
<b>Remarks</b>															
AvMC: Aviation and Missile Center; CCDC: Combat Capabilities Development Command; AMRDEC - Aviation and Missile Research Development and Engineering Center; PFRMS - Precision Fires Rocket and Missile Systems (former name for PM STORM); STORM - Strategic and Operational Rocket and Missile Systems (new name for PM PFRMS); CTSF - Central Technical Support Facility; ATEC - US Army Test and Evaluation Command; APG MD - Aberdeen Proving Ground, Maryland; WSMR - White Sands Missile Range; RTC RSA - Redstone Test Center, Redstone Arsenal, Alabama															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program	<b>Project (Number/Name)</b> DX8 / HIMARS Product Improvement Program

Event Name	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
Software Development																												
Software Qualification					 Software Qualification																							
Post System Integration Qualification									 Post System Integration Qualification																			
Improved Crew Protection (ICP) Cab Live Fire Testing (Coupon Testing)					 Coupon Testing																							
APNT Demonstration					 APNT Demonstration																							



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0603778A / MLRS Product Improvement Program	<b>Project (Number/Name)</b> DX8 / HIMARS Product Improvement Program

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Software Development	1	2019	4	2025
Software Qualification	3	2020	3	2020
Post System Integration Qualification	1	2021	3	2021
Improved Crew Protection (ICP) Cab Live Fire Testing (Coupon Testing)	4	2019	4	2019
APNT Demonstration	2	2020	2	2020

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603813A / <i>TRACTOR PULL</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	-	4.067	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.067
ET1: <i>Tractor Peel</i>	-	4.067	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.067

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

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).

<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	4.067	0.000	0.000	-	0.000
Current President's Budget	4.067	0.000	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0605024A / Anti-Tamper Technology 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
Total Program Element	-	7.159	8.491	8.682	-	8.682	8.977	9.073	7.242	7.242	Continuing	Continuing
FB1: <i>Anti-Tamper Technology Support</i>	-	7.159	8.491	8.682	-	8.682	8.977	9.073	7.242	7.242	Continuing	Continuing

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

Anti-Tamper (AT) Technology Support. The Protective Technologies (PT) organization is the Army's Technical Center for the DoD AT program, which is focused on preventing exploitation reverse engineering (RE) of U.S. systems lost or captured on the battlefield or sold via Foreign Military Sales (FMS) or Direct Commercial Sales (DCS). In support of this mission, PT's classified efforts are focused on AT Validation and Verification (V&V) activities with Army programs, AT/RE Lab facilities and equipment and AT/RE Lab assessments.

**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	7.251	8.491	8.691	-	8.691
Current President's Budget	7.159	8.491	8.682	-	8.682
Total Adjustments	-0.092	0.000	-0.009	-	-0.009
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.092	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.009	-	-0.009

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

**Project:** FB1: *Anti-Tamper Technology Support*

Congressional Add: *Anti-Tamper (AT) Congressional Add*

Congressional Add Subtotals for Project: FB1

Congressional Add Totals for all Projects

	FY 2019	FY 2020
	3.000	-
Congressional Add Subtotals for Project: FB1	3.000	-
Congressional Add Totals for all Projects	3.000	-

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0605024A / <i>Anti-Tamper Technology Support</i>				<b>Project (Number/Name)</b> FB1 / <i>Anti-Tamper Technology 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>
FB1: <i>Anti-Tamper Technology Support</i>	-	7.159	8.491	8.682	-	8.682	8.977	9.073	7.242	7.242	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Anti-Tamper (AT) Technology Support. The Protective Technologies (PT) organization is the Army's Technical Center for the DoD AT program, which is focused on preventing exploitation/reverse engineering (RE) of U.S. systems lost or captured on the battlefield or sold via Foreign Military Sales (FMS) or Direct Commercial Sales (DCS). In support of this mission, PT's classified efforts are focused on AT Validation and Verification (V&V) activities with Army programs, AT/RE Lab facilities and equipment and AT/RE Lab assessments

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Anti-Tamper (AT) Technology Support	4.158	8.105	8.682
<b>Description:</b> AT is a DoD program that encompasses the systems engineering activities intended to prevent and/or delay exploitation of critical technologies in U.S. weapon systems. These activities involve the entire life-cycle of systems acquisition, including research, development, implementation, and testing of AT measures.			
<b>FY 2020 Plans:</b> Will continue to build and maintain the PT core team of subject matter experts (SMEs) available for this ongoing mission to support the development of Army programs and evaluating their AT architectures. In support of that primary mission, PT must and will continue to build and maintain state-of-the-art RE capabilities to facilitate technical assessments to evaluate the vulnerabilities of micro-electronic components used in the electronic designs of Army weapons systems with critical program information (CPI) that requires protection.			
<b>FY 2021 Plans:</b> Will continue to build and maintain the PT core team of SMEs available for this ongoing mission to support the development of Army programs and evaluating their AT architectures. In support of that primary mission, PT must and will continue to build and maintain state-of-the-art RE capabilities to facilitate technical assessments to evaluate the vulnerabilities of micro-electronic components used in the electronic designs of Army weapons systems with CPI that requires protection.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 increase supports growing number of Army programs requiring AT support and technical oversight			
<b>Title:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun	0.001	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605024A / <i>Anti-Tamper Technology Support</i>	<b>Project (Number/Name)</b> FB1 / <i>Anti-Tamper Technology Support</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Description:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun			
<b>Title:</b> FY 2020 SBIR/STTR Transfer <b>Description:</b> Funding transferred in accordance with Title 15 USC 638	-	0.386	-
<b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC 638			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC 638			
<b>Accomplishments/Planned Programs Subtotals</b>	4.159	8.491	8.682

	<b>FY 2019</b>	<b>FY 2020</b>
<b>Congressional Add:</b> Anti-Tamper (AT) Congressional Add	3.000	-
<b>FY 2019 Accomplishments:</b> Anti-Tamper (AT) Congressional Add		
<b>Congressional Adds Subtotals</b>	3.000	-

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

N/A

**Remarks**

N/A

**D. Acquisition Strategy**

N/A

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605024A / <i>Anti-Tamper Technology Support</i>	<b>Project (Number/Name)</b> FB1 / <i>Anti-Tamper Technology Support</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			
AT CA - Accelerate new Novel Tech Solutions	TBD	AMRDEC ; , Redstone Arsenal AL	-	3.000	Mar 2019	-		-		-		-	0.000	3.000	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	N/A : N/A	-	0.001		-		-		-		-	0.000	0.001	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.386		-		-		-	0.000	0.386	-
<b>Subtotal</b>			-	3.001		0.386		-		-		-	0.000	3.387	N/A

<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			
AT V&V Activities	Various	Redstone Arsenal & Prime Contract locations : Redstone Arsenal	-	1.944	Oct 2018	2.819	Oct 2019	3.245	Oct 2020	-		3.245	0.000	8.008	-
<b>Subtotal</b>			-	1.944		2.819		3.245		-		3.245	0.000	8.008	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			
AT/RE Lab Facilities & Equipment	Various	Redstone Arsenal, AL : Redstone Arsenal, AL	-	1.352	Oct 2018	3.567	Oct 2019	3.477	Oct 2020	-		3.477	0.000	8.396	-
<b>Subtotal</b>			-	1.352		3.567		3.477		-		3.477	0.000	8.396	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army

Date: February 2020

Appropriation/Budget Activity  
2040 / 7

R-1 Program Element (Number/Name)  
PE 0605024A / Anti-Tamper Technology  
Support

Project (Number/Name)  
FB1 / Anti-Tamper Technology Support

Test and Evaluation (\$ 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				
AT/RE Laboratory Assessments	Various	Redstone Arsenal, AL : Redstone Arsenal, AL	-	0.862	Oct 2018	1.719	Oct 2019	1.960	Oct 2020	-		1.960	0.000	4.541	-	
<b>Subtotal</b>			-	0.862		1.719		1.960		-		1.960	0.000	4.541	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>				-	7.159		8.491		8.682		-		8.682	0.000	24.332	N/A

Remarks

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605024A / <i>Anti-Tamper Technology Support</i>	<b>Project (Number/Name)</b> FB1 / <i>Anti-Tamper Technology Support</i>

Event Name	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
AT V&V Activities	[Redacted]																											
AT/RE Lab Facilities and Equipment	[Redacted]																											
AT/RE Laboratory Assessments	[Redacted]																											
AT Congressional Add - New Novel Tech Solutions	[Redacted]				[Redacted]																							



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0605024A / <i>Anti-Tamper Technology Support</i>	<b>Project (Number/Name)</b> FB1 / <i>Anti-Tamper Technology Support</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
AT V&V Activities	1	2017	4	2025
AT/RE Lab Facilities and Equipment	1	2017	4	2025
AT/RE Laboratory Assessments	1	2017	4	2025
AT Congressional Add - New Novel Tech Solutions	2	2019	4	2019

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement 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	-	17.992	15.645	20.409	-	20.409	14.799	11.409	4.820	2.230	Continuing	Continuing
ER2: <i>Close Combat Technology</i>	-	3.042	2.056	6.764	-	6.764	3.511	2.744	0.666	0.000	Continuing	Continuing
ER5: <i>Indirect Fire and Fuze Technology</i>	-	3.227	5.064	4.890	-	4.890	4.518	2.398	2.156	2.230	Continuing	Continuing
ER6: <i>Direct Fire Technology</i>	-	11.723	8.525	8.755	-	8.755	6.770	6.267	1.998	0.000	Continuing	Continuing

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

Project ER2 Close Combat Technology project includes development efforts to upgrade Close Combat technologies, energetics, and munitions, such as counter explosives, grenades, demolitions, shoulder launched munitions, pyrotechnic simulators, countermeasure flares, non-lethal ammunition/systems, networked munitions and mines, that have been fielded or have received approval for full rate production. This program will identify, characterize, study, analyze, test and develop technologies to resolve close combat munition reliability, safety, environmental, storage, standardization, obsolescence and manufacturing/producibility issues. Fiscal Year (FY) 2021 funds will resource improvements to the following grenade efforts: MK3A2 Replacement - XM111 Offensive Hand Grenade, M82 Simulant Smoke Practice Grenade, M67 (G881) Insensitive Munition (IM) Replacement, and M98/M99 Non-Lethal 66mm Grenades.

Project ER5 Indirect Fire and Fuze Technology Project includes product improvement development efforts to upgrade indirect fire weapon systems and munitions that have already been fielded and/or are in production. Efforts include improved target engagement, increased reliability, availability, maintainability, and safety, standardization and interoperability with weapons and munitions of Allied Nations, defense exportability features, reduction of failure mechanisms, and supply chain risk by introducing new and alternative technology and materiel solutions, improvement of manufacturing methods and their associated production processes, new capabilities in response to the evolving and emerging threats and countermeasures, and reduction/elimination of potential environmental and health risks associated with these products. FY 2021 funding will support the transition and incorporation of the newly translated transceiver prototypes into indirect production fuzes with the generation of Engineering Change Proposals (ECPs) to the Technical Data Packages (TDPs), conduct analysis of the improved prototyping techniques of the Microelectromechanical systems (MEMS) impact switches for use in mortar and medium caliber fuzes, support the evaluations on hand grenade fuzes to reduce the number of critical defects, which will increase producibility and safety, conduct tests to prove out performance on the next generation microcontroller for mortar proximity fuzes, conduct analysis on mortar training fuzes for performance improvements during early ballistic flight, and conduct testing of enhanced delay mode design on the M739A1 artillery fuze for increased safety and performance. FY 2021 funding will also support qualification of Hexachloroethane Zinc Oxide (HC) smoke fill formulation into the 60mm and 81mm smoke families of ammunition. Engineering efforts will identify the formulation percentage of constituents and identify the production processes required to promote effective smoke production that is less toxic and ultimately provides effective smoke screening and burn time performance.

Project ER6 Direct Fire Technology funding will be used to support direct fire ammunition from small caliber ammunition, 40mm grenade, medium caliber cannon ammunition and large caliber ammunition enhancements to lethality, effectiveness, survivability, accuracy and general product improvements. FY 2021 funds support making lethality and safety improvements to 40mm grenades, performing improvements to 30mm ammunition, making a number of improvements to training ammunition, performing improvements to small caliber primers to make the primers more environmentally friendly, and continuing the effort to reduce Soldier load

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>
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by developing lightweight small caliber ammunition. FY 2021 also includes potential examination and implementation of improvements to 105mm and 120mm tank ammunition.

<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	18.551	15.645	10.197	-	10.197
Current President's Budget	17.992	15.645	20.409	-	20.409
Total Adjustments	-0.559	0.000	10.212	-	10.212
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.559	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	10.212	-	10.212

**Change Summary Explanation**

FY 2021 increase of \$4.714 million due to increased analysis, evaluation and qualification efforts for Project ER2 Close Combat Technology.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607131A / Weapons and Munitions Product Improvement Programs				<b>Project (Number/Name)</b> ER2 / Close Combat Technology			
<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>
ER2: Close Combat Technology	-	3.042	2.056	6.764	-	6.764	3.511	2.744	0.666	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Project ER2 Close Combat Technology includes development efforts to upgrade Close Combat technologies, energetics, and munitions, such as counter explosives, grenades, demolitions, shoulder launched munitions, pyrotechnic simulators, countermeasure flares, non-lethal ammunition/systems, and networked munitions and mines, that have been fielded or have received approval for full rate production. FY 2021 funding will allow the project to identify, characterize, study, analyze, test and develop technologies to resolve close combat munition reliability, safety, environmental, storage, standardization, obsolescence and manufacturing/producibility issues.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> MK3A2 Replacement , XM111 Offensive Hand Grenade</p> <p><b>Description:</b> The current MK3A2 Offensive Hand Grenade can expose the Warfighter to toxic levels of asbestos and is restricted for use in Continental United States and Outside Continental United State (CONUS/OCONUS). The warfighter cannot safely employ this grenade. Alternate munitions do not satisfy user requirements for incapacitating the enemy. This effort incorporates modern materials and insensitive explosives to provide a safer, producible offensive grenade and its associated training device, XM112.</p> <p><b>FY 2020 Plans:</b> Continued development of alternate explosive fill and built hardware in support of qualification.</p> <p><b>FY 2021 Plans:</b> Conduct testing of prototypes to determine safety, viability, and effectiveness of an alternative explosive fill..</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease due to reduced requirements to test prototypes.</p>	1.157	1.963	1.727
<p><b>Title:</b> M82 Simulant Smoke Practice Grenade</p> <p><b>Description:</b> The M82 encountered performance issues during the last production as a result of the less than optimal design for the base. Developing a new base design that minimizes any leak paths and facilitates the metal clip contact surface with the launcher will greatly improve the producibility and reliability of the grenade. This effort consists of the development and prove out of the base design.</p> <p><b>FY 2021 Plans:</b></p>	0.623	-	0.539

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER2 / <i>Close Combat Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Test prototype grenades and receive final test report from Pine Bluff Arsenal. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase required to support testing and qualification of new M82 base design.				
<b>Title:</b> M67 (G881) Fragmentation Hand Grenade <b>Description:</b> The current M67 Hand Grenade does not meet Insensitive Munitions (IM) requirements; effort will bring M213 fuze up to IM standard. <b>FY 2021 Plans:</b> Plan contract awards via Other Transactional Authority (OTA) to build prototype hardware for testing. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase due to resource requirements to build prototypes for testing.		-	-	3.478
<b>Title:</b> M98/M99 Non-Lethal 66mm Grenades <b>Description:</b> The M98/99 grenades utilize a legacy propulsion base design that is susceptible to leak paths through the clips and between the base and the grenade body. The current ignition mechanism utilizing an electric match crimped to the terminal lugs has also shown to have reliability issues. A new base design will greatly improve the producibility and reliability of the grenade. <b>FY 2021 Plans:</b> Support the development and initial testing of an improved M98 base design. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increased required to support development of new M98 base and begin initial testing.		-	-	1.020
<b>Title:</b> AN-M8A1 Obscuration Grenade <b>Description:</b> This effort supports the Design/Type Classification/Production Prove Out of an improved obscurant grenade that provides the warfighter with screening performance similar to the legacy AN-M8 smoke grenade, using a different smoke formulation than the legacy's grenade's Hexachloroethane (HC). The use of HC has been restricted inside and outside the CONUS/OCONUS due to its toxic effects. The legacy AN-M8 grenade is limited to use in contingency operations only. The M83 training smoke grenade is currently used in lieu of the AN-M8 in both training and tactical operations, but does not give screening performance comparable to the legacy AN-M8. Soldiers must use two or three M8 grenades to produce obscuration effects comparable to a single AN-M8 grenade.		1.262	-	-
<b>Title:</b> FY 2020 SBIR/STTR Transfer		-	0.093	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / Weapons and Munitions Product Improvement Programs	<b>Project (Number/Name)</b> ER2 / Close Combat Technology
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
<b>Description:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>Accomplishments/Planned Programs Subtotals</b>	3.042	2.056	6.764

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
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
• E33010: GRENADE, Hand, Offensive, XM111	0.939	-	5.694	-	5.694	13.557	12.108	13.820	13.820	0.000	59.938

**Remarks**

**D. Acquisition Strategy**

The strategy for the MK3A2 Offensive Hand Grenade is to develop, test and qualify a new design, XM111, that eliminates the toxic hazards and provides the required performance for the user in FY 2019. Follow-on procurement efforts will be competitive pending market research.

The strategy for the AN-M8A1 is to qualify an alternative fill due to obsolescence and manufacturability driven changes required to provide smoke for use by Soldiers to meet existing validated requirements. Once the smoke fill is qualified, the plan is to investigate the cost and impact to upgrade the Pine Bluff Arsenal grenade loading facilities.

The M82 program is updating the design of specific parts to make it more producible and will be proving out the design for use in future production efforts.

The M98/M99 Non-Lethal 66mm Grenades program is updating the design of the propulsion base to make it more producible and will be proving out the design for use in future production efforts at Pine Bluff Arsenal.

The strategy for the legacy M67 Fragmentation Hand Grenade is to build up to 3 different prototype designs, conduct a shoot-off to down-select to the best design, and then qualify the new design that mitigates the insensitive munition hazards associated with the explosive fill and the fuze technology. Follow-on procurement efforts will be competitive pending market research.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0607131A / Weapons and Munitions Product Improvement Programs				ER2 / Close Combat Technology							
<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
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.093		-		-		-	0.000	0.093	-
<b>Subtotal</b>			-	-		0.093		-		-		-	0.000	0.093	N/A
<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
XM111, Offensive Hand Grenade	C/FFP	Battelle Memorial Institute : Columbus, OH	0.548	0.325	Mar 2019	0.427	Jan 2020	-		-		-	Continuing	Continuing	-
M82 Simulant Smoke Practice Grenade	C/FFP	Battelle Memorial Institute : Columbus, OH	-	0.251	Aug 2019	-		-		-		-	0.000	0.251	-
AN-M8A1 Enhanced Obscuration Grenade	MIPR	CCDC - Armaments Center : Picatinny Arsenal, NJ	-	0.265	Jun 2019	-		-		-		-	0.000	0.265	-
M98/M99 Non-Lethal 66mm Grenades	C/FFP	Battelle Memorial Institute : Columbus, OH	-	-		-		0.200	Mar 2021	-		0.200	0.000	0.200	-
M67 (G881) Fragmentation Hand Grenade	MIPR	CCDC - Armaments Center : Picatinny Arsenal, NJ	-	-		-		2.767	Mar 2021	-		2.767	0.000	2.767	-
<b>Subtotal</b>			0.548	0.841		0.427		2.967		-		2.967	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
XM111, Offensive Hand Grenade	MIPR	CCDC - Armaments Center : Picatinny Arsenal, NJ	2.895	0.325	Mar 2019	1.138	Jan 2020	0.284	Oct 2020	-		0.284	Continuing	Continuing	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / Weapons and Munitions Product Improvement Programs	<b>Project (Number/Name)</b> ER2 / Close Combat Technology
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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			
XM111, Offensive Hand Grenade	MIPR	Various : Various locations	0.031	0.007	Jun 2019	0.007	Mar 2020	-		-		-	0.000	0.045	-
AN-M8A1 Enhanced Obscuration Grenade	MIPR	CCDC - Edgewood : Edgewood, MD	0.141	0.749	Feb 2019	-		-		-		-	Continuing	Continuing	-
AN-M8A1 Enhanced Obscuration Grenade	MIPR	CCDC - Armaments Center : Picatinny Arsenal, NJ	-	0.265	Jan 2019	-		-		-		-	0.000	0.265	-
M82 Simulant Smoke Practice Grenade	MIPR	CCDC - Armaments Center : Picatinny Arsenal, NJ	-	0.265	Jan 2019	-		-		-		-	Continuing	Continuing	-
M82 Simulant Smoke Practice Grenade	MIPR	CCDC - Edgewood : Edgewood, MD	-	0.095	Feb 2019	-		-		-		-	Continuing	Continuing	-
M98/M99 Non-Lethal 66mm Grenades	MIPR	CCDC - Armaments Center : Picatinny Arseanl, NJ	-	-		-		0.225	Jan 2021	-		0.225	0.000	0.225	-
M98/M99 Non-Lethal 66mm Grenades	MIPR	CCDC - Edgewood : Edgewater, MD	-	-		-		0.075	Jan 2021	-		0.075	0.000	0.075	-
M67 (G881) Fragmentation Hand Grenade	MIPR	CCDC - Armaments Center : Picatinny Arsenal, NJ	-	-		-		0.705	Jan 2021	-		0.705	0.000	0.705	-
<b>Subtotal</b>			3.067	1.706		1.145		1.289		-		1.289	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			
XM111, Offensive Hand Grenade	MIPR	Redstone Tech Test Center : Redstone Arsenal, AL	0.037	-		0.391	Jul 2020	0.233	Oct 2020	-		0.233	Continuing	Continuing	-
XM111, Offensive Hand Grenade	MIPR	Yuma : Yuma Proving Grounds, AZ	-	-		-		0.454	Oct 2020	-		0.454	0.000	0.454	-



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / Weapons and Munitions Product Improvement Programs	<b>Project (Number/Name)</b> ER2 / Close Combat Technology
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**Test and Evaluation (\$ in Millions)**

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
				Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
XM111, Offensive Hand Grenade	MIPR	ATC : Aberdeen Proving Grounds, NJ	0.351	-		-		0.756	Oct 2020	-		0.756	Continuing	Continuing	-
M98/M99 Non-Lethal 66mm Grenades	PO	Pine Bluff Arsenal : Pine Bluff, AR	-	-		-		0.520	Jul 2021	-		0.520	0.000	0.520	-
M82 Simulant Smoke Practice Grenade	MIPR	Pine Bluff Arsenal : Pine Bluff Arsenal, Arkansas	-	0.495	Sep 2019	-		0.545	Oct 2020	-		0.545	0.000	1.040	-
<b>Subtotal</b>			0.388	0.495		0.391		2.508		-		2.508	Continuing	Continuing	N/A

Project Cost Totals	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		4.003	3.042	2.056	6.764	-	6.764	Continuing	Continuing

Remarks

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER2 / <i>Close Combat Technology</i>

Event Name	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>XM111 Offensive Hand Grenade Effort</b>																																
Testing Insensitive Munitions (IM), E3	■																															
Limited User Assessment (LUA)	■																															
Type Classification (TC) Documentation	■																															
Type Classification																																
Prototype Development Contract Award																																
Prototype build for qualification testing					■																											
Qualification testing													■																			
Full Materiel Release (FMR)																																
Full Materiel Release (FMR)																																
Full Materiel Release (FMR)																																
<b>AN-M8A1 Obscuration Grenade</b>																																
Hexachloroethane Titanium Oxide (HX) Toxicity Study	■																															
AN-M8A1 Ecological Study	■																															
Starter Cup Development	■																															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER2 / <i>Close Combat Technology</i>

Event Name	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
Technical Data Package (TDP) Scrub	[Redacted]				[Redacted]																							
	TDP Scrub				[Redacted]																							
Fuze Assessment	[Redacted]				[Redacted]																							
	Fuze Assess				[Redacted]																							
Trade Analysis & Requirements Validation	[Redacted]				[Redacted]																							
	Trade Analysis				[Redacted]																							
Grenade Producibility Study	[Redacted]				[Redacted]																							
	Producibility Study				[Redacted]																							
<b>M82 Simulant Smoke Grenade Propellant Retainer Effort</b>	[Redacted]				[Redacted]																							
Propellant Retainer Development	[Redacted]				[Redacted]																							
	Development				[Redacted]																							
Prototype Mold and Parts	[Redacted]				[Redacted]																							
	Prototyping				[Redacted]																							
Design Qualification Build/Test	[Redacted]				[Redacted]				[Redacted]																			
	[Redacted]				[Redacted]				Qualification																			
Update Technical Data Packages (TDPs)	[Redacted]				[Redacted]				[Redacted]				[Redacted]															
	[Redacted]				[Redacted]				[Redacted]				TDP Update															
<b>M98/M99 Non-Lethal 66mm Grenades Propulsion Base Redesign Effort</b>	[Redacted]				[Redacted]																							
Molded Base Design Development	[Redacted]				[Redacted]				[Redacted]				[Redacted]															
	[Redacted]				[Redacted]				[Redacted]				Design Development															
Prototy Mold and Parts	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]											
	[Redacted]				[Redacted]				[Redacted]				[Redacted]				Prototyping											
Qualification Build/Test Grenade	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				Qualification							

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER2 / <i>Close Combat Technology</i>

Event Name	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																				
Engineering Change Proposals																	■ ECP																															
Insensitive Munition - M67 Fragmentation Hand Grenade																																																
Bid Sample Test/Evaluation																	■ Bid Sample																															
Qualification Hardware Build																	■ Qualification Build																															
Qualification Testing																	■ Qualification Testing																															
M67 Insensitive Munitions (IM) Type Classification Standard																																																

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER2 / <i>Close Combat Technology</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
XM111 Offensive Hand Grenade Effort	1	2017	4	2020
Testing Insensitive Munitions (IM), E3	3	2018	1	2019
Limited User Assessment (LUA)	4	2018	1	2019
Type Classification (TC) Documentation	2	2018	3	2019
Type Classification	4	2019	4	2019
Prototype Development Contract Award	1	2020	1	2020
Prototype build for qualification testing	1	2020	4	2020
Qualification testing	1	2021	3	2021
Full Materiel Release (FMR)	1	2022	1	2022
AN-M8A1 Obscuration Grenade	1	2017	4	2020
Hexachloroethane Titanium Oxide (HX) Toxicity Study	1	2017	1	2019
AN-M8A1 Ecological Study	4	2018	1	2019
Starter Cup Development	2	2018	3	2019
Technical Data Package (TDP) Scrub	1	2019	1	2019
Fuze Assessment	2	2019	3	2019
Trade Analysis & Requirements. Validation	2	2019	4	2019
Grenade Producibility Study	2	2019	1	2020
M82 Simulant Smoke Grenade Propellant Retainer Effort	1	2017	4	2020
Propellant Retainer Development	1	2019	2	2019
Prototype Mold and Parts	2	2019	2	2020
Design Qualification Build/Test	4	2020	2	2021
Update Technical Data Packages (TDPs)	3	2021	3	2021

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER2 / <i>Close Combat Technology</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
M98/M99 Non-Lethal 66mm Grenades Propulsion Base Redesign Effort	2	2021	2	2023
Molded Base Design Development	2	2021	4	2021
Prototye Mold and Parts	4	2021	2	2022
Qualification Build/Test Grenade	3	2022	1	2023
Engineering Change Proposals	2	2023	2	2023
Insensitive Munition - M67 Fragmentation Hand Grenade	1	2021	4	2027
Bid Sample Test/Evaluation	1	2021	1	2022
Qualification Hardware Build	2	2022	4	2022
Qualification Testing	1	2023	3	2024
M67 Insensitive Munitions (IM) Type Classification Standard	4	2024	4	2024

**Note**

MK3A2 Replacement, XM111 Offensive Hand Grenade Effort: schedule, with the exception of Full Material Release (FMR), depicts efforts funded via RDT&E Program Element 0607131, Project ER2 line. Efforts, beginning in FY21, are funded with Procurement of Ammunition, Army funding (Standard Study Number E33010) Grenade Hand, Offensive XM111 and are not depicted on this schedule.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>				<b>Project (Number/Name)</b> ER5 / <i>Indirect Fire and Fuze 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>
ER5: <i>Indirect Fire and Fuze Technology</i>	-	3.227	5.064	4.890	-	4.890	4.518	2.398	2.156	2.230	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Indirect Fire and Fuze Technology Project includes product improvement development efforts to upgrade indirect fire weapon systems and munitions that have already been fielded and/or are in production. Efforts include improved target engagement, increased reliability, availability, maintainability, and safety, standardization and interoperability with weapons and munitions of Allied Nations, defense exportability features, reduction of failure mechanisms, and supply chain risk by introducing new and alternative technology and materiel solutions, improvement of manufacturing methods and their associated production processes, new capabilities in response to the evolving and emerging threats and countermeasures, and reduction/elimination of potential environmental and health risks associated with these products.

This Project supports the identification, study, analysis, and integration of fuzing technologies and safe arm devices in production and in the field. The Project implements new technologies into fuzing systems to preclude obsolescence, maximize standardization, enhance performance, and improve the safety and exportability of existing munitions. The Project addresses two major areas: (1) analysis and (2) block upgrades. Analysis efforts will identify second sources for fuzing systems that may reduce costs as a result of competition, and maintain production when sources or parts are no longer available. It will also allow for the performance enhancement of current ammunition items by conducting studies of major fuze components to detect and identify latent defects. Block upgrades will identify and support studies on improvements to fuzes, increase commonality of fuze components and requirements. Upgrades will enable the introduction of the latest technologies into fuzing, keep the fuze design current to avoid obsolescence issues, and add capabilities. Fiscal Year (FY) 2021 funding will support the transition and incorporation of the newly translated transceiver prototypes into indirect production fuzes with the generation of Engineering Change Proposals (ECPs) to the Technical Data Packages (TDPs), conduct analysis of the improved prototyping techniques of the Microelectromechanical systems (MEMS) impact switches for use in mortar and medium caliber fuzes, support the evaluations on hand grenade fuzes to reduce the number of critical defects, which will increase producibility and safety, conduct tests to prove out performance on the next generation microcontroller for mortar proximity fuzes, conduct analysis on mortar training fuzes for performance improvements during early ballistic flight, and conduct testing of enhanced delay mode design on the M739A1 artillery fuze for increased safety and performance.

This Project also supports the incorporation of the new Hexachloroethane Zinc Oxide (HC) smoke fill formulation while utilizing the existing illumination shell body configuration to support mortar smoke training for US Army Europe (USAREUR). The HC smoke fill formulation is less toxic and less incendiary than the current Mortar Red Phosphorus (RP) or White Phosphorous (WP) Smoke rounds and will reduce risk of unintended collateral damage or environmentally hazardous waste. USAREUR has yearly requirements for procurement of smoke mortar cartridges across all calibers to be used for training, but is prohibited from training with the current WP or RP smoke munitions in Europe due to environmental restrictions. FY 2021 funding will support qualification of HC smoke fill formulation into the 60mm and 81mm smoke families of ammunition. Engineering efforts will identify the formulation percentage of constituents and identify the production processes required to promote effective smoke production that is less toxic and ultimately provides effective smoke screening and burn time performance.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER5 / <i>Indirect Fire and Fuze Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Fuze Technology Improvements (FTI)</p> <p><b>Description:</b> This project implements new, mature, technologies into fuzing systems to preclude obsolescence, maximize standardization, enhance performance, and improve the safety and exportability of existing munitions. The FTI project addresses two major areas: (1) analysis/risk mitigation and (2) block upgrades. Analysis efforts will identify second sources for fuzing systems that may reduce costs by providing competition, and maintain production when sources or parts are no longer available. It will also allow for the performance enhancement of current ammunition items by conducting studies of major fuze components to detect and identify latent defects. The second major area is block upgrades, which will identify and perform studies on improvements to fuzes, increase commonality of fuze components and requirements. Block upgrades will enable the introduction of the latest technologies into fuzing, keep the fuzing design current to avoid obsolescence issues, and add capabilities.</p> <p><b>FY 2020 Plans:</b> Block Upgrades: Conducted engineering tests of the medium caliber fuze safety design modifications, conducted analysis of the prototype low cost electronic safe and arm devices, conducted analysis on the hand grenade fuzes to reduce the number of critical defects that improved producibility and increase safety, and conducted studies on power sources for increased producibility and higher throughput.</p> <p>Analysis / Risk Mitigation: Supported the engineering tests and evaluations on the prototype replacement electronic transceiver prototypes for indirect fire and direct fire proximity fuzes, conducted engineering tests on the optimized impact switches for use in mortar and medium caliber fuzes, and conducted evaluations on the next generation microcontroller to replace a one time programmable component due to part obsolescence for mortar proximity fuzes.</p> <p><b>FY 2021 Plans:</b> Block Upgrades: Will conduct engineering tests of enhanced fuze delay mode designs on the M739A1 Point Detonation (PD) fuze for increased safety and improved performance, will conduct laboratory evaluations on the hand grenade fuzes to reduce the number of critical defects that will improve producibility and increase safety, will conduct studies of airburst fuzing technologies for medium and large caliber munitions, and will conduct analysis and laboratory evaluations on mortar training fuzes for increased safety and improved performance.</p> <p>Analysis / Risk Mitigation: Will conduct engineering tests on the next generation micro-controller to modernize and replace a one-time programmable component for mortar proximity fuzes, will transition prototype replacement electronic transceivers into indirect fire fuzes and generate Engineering Change Proposals (ECPs) to incorporate into the Technical Data Packages (TDPs). Will also conduct analysis on alternative suppliers for critical fuzing components.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>		3.227	2.120	2.263



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER5 / <i>Indirect Fire and Fuze Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Increase in funding due to additional Fuze Technology Integration projects that have been identified for execution.				
<p><b>Title:</b> Mortar Smoke Development</p> <p><b>Description:</b> The initial phase of this project will focus on validating smoke canister and mortar cartridge designs for the 120 millimeter (mm) caliber culminating in a technology demonstration. Qualification, and safety testing will follow to work towards a full Type Classification. The second and third phase of this project will identify similar solutions for the 81mm and 60mm caliber respectively.</p> <p><b>FY 2020 Plans:</b> Phase 1 - 120mm qualification and safety testing followed to work towards a full Type Classification. Phase 2 - 81mm caliber design qualification: Activities focused on engineering efforts to identify the formulation percentage of constants that provides effective smoke screening and burn time performance. Analysis of results for smoke performance was conducted to identify the production processes required to provide consistent results during both mixing and pressing operations. Engineering efforts focused on development of a smoke canister design that promoted effective smoke production and screening while being adapted to existing mortar cartridge carrier designs.</p> <p><b>FY 2021 Plans:</b> FY 2021 funding will support qualification of HC smoke fill formulation into the 60mm and 81mm smoke families of ammunition. Engineering efforts will identify the formulation percentage of constituents and identify the production processes required to promote effective smoke production that is less toxic and ultimately provides effective smoke screening and burn time performance.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase in funding from FY 2020 to FY 2021 due to 60mm and 81mm Hexachloroethane Zinc Oxide (HC) Smoke Mortar qualification and safety testing requirements.</p>		-	1.591	2.627
<p><b>Title:</b> Conventional Ammunition Range and Reliability Improvements</p> <p><b>Description:</b> This project explores possibilities of increasing range, enhancing reliability, and increasing performance of Artillery and Mortar ammunition. This effort supports analysis efforts to identify improvement areas to key parameters.</p> <p><b>FY 2020 Plans:</b> Studies and analysis (Key Parameter Development and Management (KPDM) and Model Based Systems Engineering (MBSE)) was conducted. The outcomes of these activities identified areas of possible improvement.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>		-	1.123	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER5 / <i>Indirect Fire and Fuze Technology</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Decrease in funding from FY 2020 to FY 2021 due to reduced requirements.			
<b>Title:</b> FY 2020 SBIR/STTR Transfer	-	0.230	-
<b>Description:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>Accomplishments/Planned Programs Subtotals</b>	3.227	5.064	4.890

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

N/A

**Remarks**

**D. Acquisition Strategy**

Fuze Technology Integration (FTI) will improve current production munitions by exploiting existing fuzing technologies and inserting them into current fielded and/or production fuzes, providing safer, more producible, and more lethal fuzing solutions. FTI develops second source suppliers and resolves component obsolescence issues to mitigate risk and prevent production interruptions in order to continue to provide safer, more reliable munitions for the Warfighter with significant risk reduction to production fuzes also benefiting the U.S. Taxpayer. The effort is a continuation of studies, analysis, evaluations, and development of fuzing technologies and safe and arm devices in production and in the field. This program will implement these technologies into fuzing systems to preclude component obsolescence, maximize standardization, enhance performance, and improve the safety and exportability of existing munitions. FTI utilizes both the DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) to produce prototypes of the fuze technologies and devices, and Federal Acquisition Regulation (FAR) based contracts to implement proven efforts into production fuzes.

The Hexachloroethane Zinc Oxide (HC) smoke mortar cartridge project will use existing production process and technologies at Government Owned Government Operated (GOGO) facilities that currently produce 60mm/81mm/120mm smoke and illumination munitions. Crane Army Ammunition Activity (CAAA) Pyro will be responsible for mixing and pressing HC smoke compositions for all testing and development, and CAAA fabrication shop will produce smoke canisters. Pine Bluff Arsenal (PBA) will conduct body load and Load Assemble and Pack (LAP) of all cartridge test samples for qualification and validation testing. All other components will use standard parts currently in inventory or can be purchased through existing component contracts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0607131A / Weapons and Munitions Product Improvement Programs				ER5 / Indirect Fire and Fuze Technology							
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
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.230		-		-		-	0.000	0.230	-
<b>Subtotal</b>			-	-		0.230		-		-		-	0.000	0.230	N/A
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
Fuze Technology Integration Development	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	1.298	2.161	Oct 2018	0.975	Oct 2019	1.350	Oct 2020	-		1.350	0.000	5.784	-
Mortar Smoke Development	MIPR	Government Owned Government Operated (GOGO) Facilities : Various	0.357	-		0.775	Feb 2020	0.637	Jan 2021	-		0.637	0.000	1.769	-
Conventional Ammunition Range and Lethality Improvements	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	-	-		0.820	Feb 2020	-		-		-	0.000	0.820	-
<b>Subtotal</b>			1.655	2.161		2.570		1.987		-		1.987	0.000	8.373	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
Fuze Technology Integration Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	2.217	1.066	Oct 2018	1.071	Oct 2019	0.913	Oct 2020	-		0.913	0.000	5.267	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / Weapons and Munitions Product Improvement Programs	<b>Project (Number/Name)</b> ER5 / Indirect Fire and Fuze Technology
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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			
Mortar Smoke Development Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	0.553	-		0.249	Feb 2020	0.525	Oct 2020	-		0.525	0.000	1.327	-
Mortar Smoke Development Engineering Support	MIPR	Combat Capabilities Development Command Chemical Biological Center (CCDC CBC) : Army Research Laboratory, MD	0.212	-		0.144	Feb 2020	0.175	Nov 2020	-		0.175	0.000	0.531	-
Conventional Ammunition Range and Lethality Improvements	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	-	-		0.329	Feb 2020	-		-		-	0.000	0.329	-
<b>Subtotal</b>			2.982	1.066		1.793		1.613		-		1.613	0.000	7.454	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 Technology Integration Ballistic Testing	MIPR	Army Test and Evaluation Command (ATEC) : Yuma Proving Ground, AZ	0.100	-		0.074	Mar 2020	-		-		-	0.000	0.174	-
Mortar Smoke Testing	MIPR	Army Test and Evaluation Command (ATEC) : Yuma Proving Ground, AZ	0.199	-		0.397	Feb 2020	1.290	Feb 2021	-		1.290	0.000	1.886	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army											Date: February 2020				
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607131A / Weapons and Munitions Product Improvement Programs					Project (Number/Name) ER5 / Indirect Fire and Fuze Technology					
Test and Evaluation (\$ 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	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	-		0.471		1.290		-		1.290	0.000	2.060	N/A
<b>Subtotal</b>			0.299												
			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>			4.936	3.227		5.064		4.890		-		4.890	0.000	18.117	N/A

Remarks

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER5 / <i>Indirect Fire and Fuze Technology</i>

Event Name	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>Fuze Technology Integration</b>																												
M734A1 Electronics Upgrade																												
Replace Obsolete Prox Electronic Components																												
MEMS G-Switch Producibility Improvements																												
40mm Fuze Safety Improvements																												
Electronic Safe and Arm Indirect Fire Enhancements																												
Hand Grenade Fuze Improvements																												
Mortar Fuze Microcontroller Replacement																												
M739A1 Delay Mode Enhancements																												
M783 Mortar Training Fuze Project Improvement																												
Airburst Fuze Technology for Med/Large Caliber Munitions																												
Alternate Suppliers for Critical Fuzing Components																												
<b>Mortars Smoke Development</b>																												

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER5 / <i>Indirect Fire and Fuze Technology</i>

Event Name	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
120MM Smoke Fabrication	██████████																											
120MM Smoke Ballistic Testing & Demonstration					▲ 1 120MM Demo																							
120MM Smoke Qualification Testing					██████████																							
60MM / 81MM Smoke Design Phase									██████████																			
60MM / 81MM Component Fabrication									██████████																			
60MM / 81MM Smoke Design Qualification													██████████															
Mortars Smoke Full Rate Production (FRP)													▲ 2 FRP															
<b>Conventional Ammunition Range and Lethality Improvements</b>																												
Conventional Ammunition Improvements					██████████																							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER5 / <i>Indirect Fire and Fuze Technology</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Fuze Technology Integration	1	2016	4	2025
M734A1 Electronics Upgrade	1	2016	1	2019
Replace Obsolete Prox Electronic Components	1	2017	4	2021
MEMS G-Switch Producibility Improvements	1	2018	4	2020
40mm Fuze Safety Improvements	1	2018	4	2020
Electronic Safe and Arm Indirect Fire Enhancements	1	2019	4	2020
Hand Grenade Fuze Improvements	1	2020	4	2022
Mortar Fuze Microcontroller Replacement	1	2019	4	2022
M739A1 Delay Mode Enhancements	1	2020	4	2022
M783 Mortar Training Fuze Project Improvement	1	2021	4	2024
Airburst Fuze Technology for Med/Large Caliber Munitions	1	2021	4	2024
Alternate Suppliers for Critical Fuzing Components	1	2021	4	2025
Mortars Smoke Development	1	2020	4	2023
120MM Smoke Fabrication	3	2018	1	2020
120MM Smoke Ballistic Testing & Demonstration	1	2020	1	2020
120MM Smoke Qualification Testing	1	2020	1	2022
60MM / 81MM Smoke Design Phase	1	2021	3	2021
60MM / 81MM Component Fabrication	1	2021	1	2022
60MM / 81MM Smoke Design Qualification	4	2021	1	2022
Mortars Smoke Full Rate Production (FRP)	1	2022	1	2022
Conventional Ammunition Range and Lethality Improvements	1	2020	4	2022
Conventional Ammunition Improvements	1	2020	4	2020



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>				<b>Project (Number/Name)</b> ER6 / <i>Direct Fire 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>
ER6: <i>Direct Fire Technology</i>	-	11.723	8.525	8.755	-	8.755	6.770	6.267	1.998	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Direct Fire Technology funding will be used to support direct fire ammunition from small caliber ammunition, 40 millimeter (mm) grenade, medium caliber cannon ammunition and large caliber ammunition enhancements to lethality, effectiveness, survivability, accuracy and general product improvements. Fiscal Year (FY) 2021 funds support making lethality and safety improvements to 40mm grenades, performing improvements to 30mm ammunition, making a number of improvements to training ammunition, performing improvements to small caliber primers to make the primers more environmentally friendly, and continuing the effort to reduce Soldier load by developing lightweight small caliber ammunition. FY 2021 also includes potential examination and implementation of improvements to 105mm and 120mm tank ammunition.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Lightweight Ammunition	0.512	2.950	3.075
<b>Description:</b> Develop, demonstrate, and qualify a Lightweight Small Caliber Ammunition (LSCA) 7.62mm, 5.56mm, .50 caliber and other caliber capability that will provide an ammunition weight savings of ten to fifty percent to the M2, M240, M4A1, and M249 gunner, assistant gunner, and ammo bearer.			
<b>FY 2020 Plans:</b> In FY 2020, the Government down-selected to a single contractor and 7.62mm concept before entering into Phase III. Phase III contractor is optimizing their 7.62mm lightweight cartridge design ahead of Validation Testing (VT) and Limited User Evaluation (LUE). Supported multiple contract awards to develop a Lightweight .50 caliber design ahead of down-selecting to a single design.			
<b>FY 2021 Plans:</b> FY 2021 funding will support Phase III development contract to build lightweight 7.62mm ammunition, performing Validation Testing, conducting and Limited User Evaluation (LUE), and accomplishing the Engineering Change Proposal (ECP) in preparation for Low-Rate Initial Production (LRIP). FY 2021 also supports Phase I development efforts for the lightweight .50 Caliber ammunition variant, performing Validation Testing, conducting a Limited User Evaluation, and conducting a Critical Design Review (CDR).			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Planned development costs for both the 7.62mm and .50 caliber lightweight ammunition efforts.			
<b>Title:</b> Lead Free Primer	1.800	1.875	3.062

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER6 / <i>Direct Fire Technology</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> Automate and integrate environment friendly lead free primary explosives within the small caliber family of ammunition. Addresses health concerns of lead intake during firing by removing lead styphnate from small caliber primers. Automated pilot line combined with new mix reduces human exposure, improves quality, improves safety and reduces environmental waste in manufacturing process.</p> <p><b>FY 2020 Plans:</b> FY 2020 supported completion of 5.56mm green primer Production Qualification Testing (PQT), completed the build and test in support of Pre-Production Qualification Testing (PPQT) for 7.62mm green primer ammunition, and begun the build for .50 Caliber PPQT.</p> <p><b>FY 2021 Plans:</b> FY 2021 funding will support the prove out of the prototype manufacturing line for building lead free primers for multiple small caliber ammunition variants and performing Pre Production Qualification Testing (PPQT) activities for the 5.56mm/7.62mm ammunition. Commercial primer testing will also be done to determine extreme temperature sensitivity and overall reliability.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Request increase due to planned qualification testing occurring in FY 2021.</p>				
<p><b>Title:</b> Support Sniper Ammunition Integration Into Army Standard Sniper Weapons</p> <p><b>Description:</b> Modify existing sniper ammunition to support integration into new Army standard sniper weapons. Maintain compatibility with legacy sniper weapons while improving operational availability.</p> <p><b>FY 2020 Plans:</b> FY 2020 supported test and evaluate sniper ammunition improvements.</p> <p><b>FY 2021 Plans:</b> FY 2021 funding will support evaluating and testing sniper ammunition for potential future improvements.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increase from FY 2020 to FY 2021 due to economic adjustments.</p>		0.500	0.176	0.200
<p><b>Title:</b> Support Improvements in Direct Fire Propulsion Systems</p> <p><b>Description:</b> Improve Direct Fire Propulsion Systems to increase user survivability.</p> <p><b>FY 2020 Plans:</b></p>		0.500	0.076	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER6 / <i>Direct Fire Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
FY 2020 supported improvements to address temperature sensitivities of energetics and primer ballistics. Continued exploring technology improvements to reduce muzzle flash and increased precision by reducing dispersion of the M80A1, M118LR, and other sniper compatible ammunition. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No funding planned in FY 2021.				
<b>Title:</b> Improved M789 Lethality, Warhead Fragmentation Improvement <b>Description:</b> Improve 30mm M789 warhead lethality by performing trade studies and implementing advanced warhead and fuze technologies to promote more efficient fragmentation. <b>FY 2020 Plans:</b> FY 2020 supported shape charge testing, ballistics testing, and lethality modeling. <b>FY 2021 Plans:</b> FY 2021 will support the implementation of the improved warhead fragmentation technology into 30mm HEDP M789 or XM1206 30mm M789 with selectable proximity fuze. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No funding planned in FY 2021.		0.650	0.226	0.250
<b>Title:</b> M433 Warhead Improvement <b>Description:</b> Improve 40mm warhead design to increase fragmentation and aeroballistics in order to improve lethality (fragmentation) and accuracy of the M433 grenade. <b>FY 2020 Plans:</b> FY 2020 supported the start the pre-production qualification testing to assess safety and performance increases. Integration of dual spin fuze into M433E1 qualification testing. <b>FY 2021 Plans:</b> FY 2021 will complete the Pre Production Qualification Test (PPQT) and finalize ECP and Type Classification documentation. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increase from FY 2020 to FY 2021 due to economic adjustments.		2.400	0.575	0.600
<b>Title:</b> 20mm C-RAM Ammo Improvement <b>Description:</b> As per Joint Urgent Operational Needs Statement (JUONS) CC-0562 for enhanced lethality, M940 20mm ammunition requires research and development efforts to increase the lethality effects of the Land-based Phalanx Weapon		0.500	0.126	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER6 / <i>Direct Fire Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>System (LPWS) against larger rocket threats. This effort will increase the current capability of the M940 by incorporating design features to provide improvement to probability of Kill. This effort will also evaluate the effects the new ammunition has on the weapon system barrel wear.</p> <p><b>FY 2020 Plans:</b> FY 2020 supported the design and development of an optimized M940 concept and conducted studies and testing to improve barrel wear.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No funding planned in FY 2021.</p>				
<p><b>Title:</b> Tank Ammunition Improvements</p> <p><b>Description:</b> Develop and test potential improvements to 105mm and 120mm gun system ammunition.</p> <p><b>FY 2020 Plans:</b> FY 2020 supported various efforts for 105mm and 120mm tank ammunition, including tracer improvements, combustible cartridge case design and fabrication improvements, and cartridge testing for the M68 cannon. Additionally, initial feasibility studies and developmental efforts explored a 105mm Advanced Multipurpose (AMP) cartridge.</p> <p><b>FY 2021 Plans:</b> FY 2021 funding will support continuing various 105mm and 120mm tank ammunition improvement efforts, including tracer improvements, combustible cartridge case design and fabrication improvements, and continuing efforts to assess the 105mm Advanced Multipurpose (AMP) cartridge/solution. Evaluate 105mm candidate cartridges, perform warhead lethality studies, modeling and simulation, conduct fuze assessment studies, perform propulsion system evaluation, assess fabrication improvements, and perform integration and testing of tank cartridges.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 increase request due to planned testing of modified 105mm and 120mm ammunition prototypes.</p>		1.700	0.476	0.518
<p><b>Title:</b> 40mm M576 Improvement Study</p> <p><b>Description:</b> 40mm M576 product improvement will provide the warfighter with the ability to quickly defeat closed-in personnel targets</p> <p><b>FY 2020 Plans:</b> FY 2020 funding supported exploration of improved candidate designs.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>		0.300	0.176	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER6 / <i>Direct Fire Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
No funding planned in FY 2021.				
<p><b>Title:</b> Single Crystal Tungsten Evaluation</p> <p><b>Description:</b> Testing will be conducted to determine the effectiveness of single crystal tungsten penetrators against armored targets.</p> <p><b>FY 2020 Plans:</b> FY 2020 funding supported testing and explored improvements to kinetic energy munitions to increase armor penetration effects.</p> <p><b>FY 2021 Plans:</b> FY 2021 funding will support continued testing and explore improvements to kinetic energy munitions to increase armor penetration effects.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increase from FY 2020 to FY 2021 due to economic adjustments.</p>		0.600	0.176	0.200
<p><b>Title:</b> M550 Fuze Improvement</p> <p><b>Description:</b> Replace 40mm M550 single stage fuze with a dual spinlock fuze to improve safety and performance reliability.</p> <p><b>FY 2020 Plans:</b> FY 2020 funding supported completing and building the quantity required to support qualification testing planned for FY 2021.</p> <p><b>FY 2021 Plans:</b> FY 2021 funding will support qualification testing of the 40mm grenades in preparation for implementation of the Engineering Change Proposal (ECP).</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increase from FY 2020 to FY 2021 due to economic adjustments.</p>		0.300	0.276	0.300
<p><b>Title:</b> Caliber .50 Improvement</p> <p><b>Description:</b> Explore options for improvement to current legacy .50 caliber ammunition in response to the .50 caliber Munitions Capabilities Development Document (CDD).</p> <p><b>FY 2020 Plans:</b> FY 2020 supported Design Verification Test (DVT) 1 and DVT 2 of enhanced M903, M962, and other .50 caliber rounds as per required in the .50 Caliber Munitions CDD.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>		0.561	0.476	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER6 / <i>Direct Fire Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
No funding planned in FY 2021.				
<b>Title:</b> Operation Inherent Resolve for ISIL - JUONS CC-0562 M940 Ammunition <b>Description:</b> FY 2019 Overseas Contingency Operations request for a Joint Urgent Operational Needs Statement for M940 ammunition.		1.400	-	-
<b>Title:</b> 40mm Airburst Training <b>Description:</b> Conduct studies and explore options to satisfy 40mm airburst training requirements. <b>FY 2020 Plans:</b> FY 2020 funding supported conducting a study to explore options that satisfied 40mm airburst training requirements. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No funding planned in FY 2021.		-	0.076	-
<b>Title:</b> 7.62mm Dispersion Improvement <b>Description:</b> Explore options for dispersion improvement to 7.62mm ammunition, specifically the XM1158 and M80A1, to provide increased lethality to the warfighter. <b>FY 2020 Plans:</b> FY 2020 funding supported exploration into 7.62mm dispersion improvement methods to provide increased lethality to the warfighter. <b>FY 2021 Plans:</b> FY 2021 funding will support assessing potential modifications such as design changes and propellant changes to improve the dispersion on 7.62mm ammunition. Funding will also support building prototypes and delivering the prototypes to Government test activities to perform testing. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increase from FY 2020 to FY 2021 due to economic adjustments.		-	0.276	0.300
<b>Title:</b> Handgun Ammunition Enhancements <b>Description:</b> Modify existing handgun ammunition to increase battlefield effectiveness beyond current capabilities. <b>FY 2020 Plans:</b>		-	0.126	0.150

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER6 / <i>Direct Fire Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
FY 2020 activities supported testing and evaluating new handgun ammunition improvements.				
<p><b>FY 2021 Plans:</b> FY 2021 funding will support testing and evaluating potential improvements to handgun ammunition to achieve an increase in overall lethality and effectiveness.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increase from FY 2020 to FY 2021 due to economic adjustments.</p>				
<p><b>Title:</b> Grenade Rifle Entry Munition (GREM) Improvements</p> <p><b>Description:</b> Explore improvements to the Grenade Rifle Entry Munition (GREM) in order to increase performance and reliability and reduce costs.</p> <p><b>FY 2020 Plans:</b> FY 2020 funding supported conducting studies and performing preliminary tests to increase the performance and reliability of the Grenade Rifle Entry Munition (GREM) system.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No funding planned in FY 2021.</p>		-	0.076	-
<p><b>Title:</b> 40mm Improvements</p> <p><b>Description:</b> Improve training and tactical rounds in the Low and High Velocity family of ammunition.</p> <p><b>FY 2021 Plans:</b> FY 2021 funding will support exploring air bursting and other potential improvements to the M430A1 direct fire grenade by conducting assessments and testing of potential solutions to increase the lethal effects of the M430 grenade. Explore improvements to 40mm Day Night Thermal rounds.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Planned costs to conduct assessments in FY 2021.</p>		-	-	0.100
<p><b>Title:</b> FY 2020 SBIR/STTR Transfer</p> <p><b>Description:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>		-	0.387	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER6 / <i>Direct Fire Technology</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Funding transferred in accordance with Title 15 USC ?638			
<b>Accomplishments/Planned Programs Subtotals</b>	11.723	8.525	8.755

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

N/A

**Remarks**

**D. Acquisition Strategy**

The acquisition strategy for small, medium and large caliber product improvements is that all contracts will be full and open competition firm fixed price.



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / Weapons and Munitions Product Improvement Programs	<b>Project (Number/Name)</b> ER6 / Direct Fire Technology
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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			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.387		-		-		-	0.000	0.387	-
<b>Subtotal</b>			-	-		0.387		-		-		-	0.000	0.387	N/A

<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			
Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : New Jersey	-	0.110	Dec 2018	0.055	Dec 2019	0.110	Dec 2020	-		0.110	0.000	0.275	-
M433 Warhead Improvement - Contract 1	C/FFP	Amtec Corporation : Janesville, WI	-	0.820	Sep 2019	-		-		-		-	0.000	0.820	-
M789 Enhanced Lethality - Contract 1	C/FFP	General Dynamics : Marion, Virginia	-	0.350	Apr 2019	-		-		-		-	0.000	0.350	-
Lightweight Ammunition - Contract 1	C/FFP	To Be Determined : To Be Determined	-	-		1.545	Mar 2020	2.000	Mar 2021	-		2.000	Continuing	Continuing	Continuing
Green Primer - Contract 1	C/FFP	Innovative Materials & Processes (IMP), LLC : Rapid City, South Dakota	-	-		0.160	Feb 2020	-		-		-	0.000	0.160	-
Green Primer - Contract 2	C/FFP	TBD : TBD	-	-		0.245	Mar 2020	0.900	Mar 2021	-		0.900	Continuing	Continuing	Continuing
Green Primer - Contract 3	C/FFP	Franklin Engineering Group : Nashville, Tennessee	-	0.200	Sep 2019	-		-		-		-	0.000	0.200	-
JUONS CC-0562 M940 Ammunition - Contract 1	C/FFP	General Dynamics Ordnance and Tactical Systems (GS OTS) : St. Petersburg, Florida	-	1.500	Aug 2019	-		-		-		-	0.000	1.500	-
Single Crystal Tungsten Penetrators - Contract 1	Option/CPFF	Savit Corporation : Rockaway, New Jersey	-	0.020	Jul 2019	-		-		-		-	0.000	0.020	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0607131A / Weapons and Munitions Product Improvement Programs				ER6 / Direct Fire Technology							
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
M550 Fuze Development - Contract 1	C/FFP	AMTEC CORPORATION : Janesville, WI	-	0.020	Sep 2019	-		-		-		-	0.000	0.020	-
Tank Ammunition Improvement Contract	TBD	To Be Determined : To Be Determined	-	-		-		0.600	Mar 2021	-		0.600	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	3.020		2.005		3.610		-		3.610	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
CCDC Armaments Center Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	4.314	Nov 2018	3.409	Nov 2019	3.145	Nov 2020	-		3.145	Continuing	Continuing	Continuing
JUONS CC-0562 M940 Ammunition Support ARL	MIPR	CCDC Army Research Lab : Aberdeen, Maryland	-	0.050	Jan 2019	-		-		-		-	0.000	0.050	-
JUONS CC-0562 M940 Ammunition Support AC	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	0.712	Jan 2019	-		-		-		-	0.000	0.712	-
Lightweight Ammunition Demil Assesment	MIPR	Tooele Army Depot : Tooele, Utah	-	0.080	Jul 2019	-		-		-		-	0.000	0.080	-
<b>Subtotal</b>			-	5.156		3.409		3.145		-		3.145	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
Army Research Lab (ARL)	MIPR	CCDC Army Research Lab (ARL) : Aberdeen, Maryland	-	0.585	Jan 2019	0.845	Jan 2020	0.900	Jan 2021	-		0.900	Continuing	Continuing	Continuing

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER6 / <i>Direct Fire Technology</i>
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Test and Evaluation (\$ 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			
Aberdeen Test Center (ATC)	MIPR	Aberdeen Test Center (ATC) : Aberdeen, Maryland	-	1.965	Jan 2019	1.879	Jan 2020	1.100	Jan 2021	-		1.100	Continuing	Continuing	Continuing
JUONS CC-0562 M940 Ammunition Testing	MIPR	CCDC Aviation & Missile Center : Redstone Arsenal, Alabama	-	0.847	Jan 2019	-		-		-		-	0.000	0.847	-
Lightweight Ammunition - User Evaluaton	MIPR	Maneuver Battle Lab : Fort Benning, Georgia	-	0.150	Jul 2019	-		-		-		-	0.000	0.150	-
<b>Subtotal</b>			-	3.547		2.724		2.000		-		2.000	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			-	11.723		8.525		8.755		-		8.755	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date: February 2020</b>
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER6 / <i>Direct Fire Technology</i>

Event Name	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
M433 Warhead Improvement																												
M433 Warhead Improvement																												
Improved M789 Lethality, Warhead Fragmentation Improvement																												
Improved M789 Lethality, Warhead Fragmentation Improvement																												
Lightweight Ammunition																												
Lightweight Ammunition																												
Lead Free Primer																												
Lead Free Primer																												
20mm C-RAM Ammo Improvement																												
20mm C-RAM Ammo Improvement																												
Support Sniper Ammunition Integration Into Army Standard Sniper Weapons																												
Support Sniper Ammunition Integration Into Army Standard Sniper Weapons																												
Support improvements in Direct Fire Propulsion Systems																												
Support improvements in Direct Fire Propulsion Systems																												
Tank Ammunition Improvements																												
Tank Ammunition Improvements																												
40mm M576 Improvement Study																												
40mm M576 Improvement Study																												
Medium Caliber Single Crystal Tungsten Evaluation																												
Medium Caliber Single Crystal Tungsten Evaluation																												
JUONS CC-0562 M940 Ammunition																												
JUONS CC-0562 M940 Ammunition																												
.50 Caliber Improvements																												
.50 Caliber Improvements																												
M550 Fuze Escapement																												
M550 Fuze Escapement																												

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER6 / <i>Direct Fire Technology</i>

Event Name	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
40mm Airburst Training																												
40mm Airburst Training																												
7.62mm Dispersion Improvement																												
7.62mm Dispersion Improvement																												
Handgun Ammunition Enhancements																												
Handgun Enhancements																												
Grenade Rifle Entry Munition (GREM) Improvements																												
Grenade Rifle Entry Munition (GREM) Improvements																												
40mm M430A1 Warhead Improvement																												
40mm M430A1 Warhead Improvement																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	<b>Project (Number/Name)</b> ER6 / <i>Direct Fire Technology</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
M433 Warhead Improvement	1	2015	4	2021
Improved M789 Lethality, Warhead Fragmentation Improvement	1	2015	4	2020
Lightweight Ammunition	1	2015	4	2023
Lead Free Primer	1	2015	4	2024
20mm C-RAM Ammo Improvement	1	2017	4	2020
Support Sniper Ammunition Integration Into Army Standard Sniper Weapons	1	2017	4	2021
Support improvements in Direct Fire Propulsion Systems	1	2017	4	2020
Tank Ammunition Improvements	1	2018	4	2023
40mm M576 Improvement Study	1	2018	4	2020
Medium Caliber Single Crystal Tungsten Evaluation	1	2018	4	2022
JUONS CC-0562 M940 Ammunition	1	2019	1	2020
.50 Caliber Improvements	1	2019	4	2020
M550 Fuze Escapement	1	2019	4	2021
40mm Airburst Training	1	2020	1	2021
7.62mm Dispersion Improvement	1	2020	4	2023
Handgun Ammunition Enhancements	1	2020	4	2021
Grenade Rifle Entry Munition (GREM) Improvements	1	2020	1	2021
40mm M430A1 Warhead Improvement	1	2021	4	2021

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607133A / <i>TRACTOR SMOKE</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	-	12.357	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.357
ET2: <i>Tractor Stove</i>	-	12.357	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.357

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

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).

**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	12.357	0.000	0.000	-	0.000
Current President's Budget	12.357	0.000	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607134A / <i>Long Range Precision Fires (LRPF)</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	-	152.573	156.682	122.733	-	122.733	145.681	183.768	231.673	231.680	Continuing	Continuing
ES1: <i>Long Range Precision Fires (LRPF)</i>	-	152.573	156.682	122.733	-	122.733	145.681	183.768	231.673	231.680	Continuing	Continuing

**Program MDAP/MAIS Code:** 494

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

Precision Strike Missile (PrSM), formerly known as Long Range Precision Fires (LRPF), is the Army's next generation surface-to-surface missile that replaces and improves upon Army Tactical Missile System (ATACMS) capabilities. PrSM requirements include: max range of greater than 400 kilometers (km), specified lethality against the designated target set, a Launch Pod Missile Container (LPMC) that holds two missiles, survivability in a threat environment, and compatibility with the existing launcher platforms (M270A2 Multiple Launch Rocket System (MLRS) and M142 High Mobility Artillery Rocket System (HIMARS)). PrSM will meet cluster and insensitive munition requirements and is being designed with an open system architecture that provides the capability for future growth to counter new and emerging threats. Future Spirals will include the ability to attack moving maritime and ground targets, provide increased lethality and extended range. The mission of the PrSM System is to attack/ neutralize/suppress/destroy targets using missile delivered indirect precision fires. PrSM will provide Joint Force Commanders with a 24/7, all-weather capability to attack critical and time sensitive area and point targets including threat air defense, missile launchers, command and control centers, assembly/staging areas and high payoff targets at all depths of the multi-domain battlefield. PrSM will counter the enemy's ability to conduct combat maneuver and air defense operations. Milestone A was approved on 31 March 2017 and the program is currently in the Technology Maturation and Risk Reduction (TMRR) phase.

Fiscal Year (FY) 2021 base dollars in the amount of \$122.733 million supports the transition of PrSM from TMRR to Engineering Manufacturing Development (EMD). The program successfully completed a flight demonstration in 1st Quarter (1Q) FY 2020 and awarded a follow-on TMRR agreement to a single contractor. TMRR efforts to include: finalize tactical design, complete sub-assembly and missile qualification testing, finalize missile interface, and continue software integration with existing launcher platforms before flight testing four (4) PrSM Engineering Development Test (EDT) missiles. Additionally, the program will establish pilot line manufacturing processes and validate capabilities to support PrSM production. Demonstration of capabilities through a rigorous test program ensures the Army makes an informed production decision for building missiles beginning in FY 2022. After completion of Milestone B, the Government will award a single EMD phase contract for final Government safety and qualification testing.



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607134A / <i>Long Range Precision Fires (LRPF)</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	159.278	164.182	122.852	-	122.852
Current President's Budget	152.573	156.682	122.733	-	122.733
Total Adjustments	-6.705	-7.500	-0.119	-	-0.119
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-7.500			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-6.705	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.119	-	-0.119

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607134A / Long Range Precision Fires (LRPF)					<b>Project (Number/Name)</b> ES1 / Long Range Precision Fires (LRPF)		
<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>
ES1: Long Range Precision Fires (LRPF)	-	152.573	156.682	122.733	-	122.733	145.681	183.768	231.673	231.680	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Precision Strike Missile (PrSM), formerly known as Long Range Precision Fires (LRPF), is the Army's next generation surface-to-surface missile that replaces and improves upon Army Tactical Missile System (ATACMS) capabilities. PrSM requirements include: max range of greater than 400 kilometers (km), specified lethality against the designated target set, a Launch Pod Missile Container (LPMC) that holds two missiles, survivability in a threat environment, and compatibility with the existing launcher platforms (M270A2 Multiple Launch Rocket System (MLRS) and M142 High Mobility Artillery Rocket System (HIMARS)). PrSM will meet cluster and insensitive munition requirements and is being designed with an open system architecture that provides the capability for future growth to counter new and emerging threats. Future Spirals will include the ability to attack moving maritime and ground targets, provide increased lethality and extended range. The mission of the PrSM System is to attack/ neutralize/suppress/destroy targets using missile delivered indirect precision fires. PrSM will provide Joint Force Commanders with a 24/7, all-weather capability to attack critical and time sensitive area and point targets including threat air defense, missile launchers, command and control centers, assembly/ staging areas and high payoff targets at all depths of the multi-domain battlefield. PrSM will counter the enemy's ability to conduct combat maneuver and air defense operations. Milestone A was approved on 31 March 2017 and the program is currently in the Technology Maturation and Risk Reduction (TMRR) phase.

Fiscal Year (FY) 2021 base dollars in the amount of \$122.733 million supports the transition of PrSM from TMRR to Engineering Manufacturing Development (EMD). The program successfully completed a flight demonstration in 1st Quarter (1Q) FY 2020 and awarded a follow-on TMRR agreement to a single contractor. TMRR efforts to include: finalize tactical design, complete sub-assembly and missile qualification testing, finalize missile interface, and continue software integration with existing launcher platforms before flight testing four (4) PrSM Engineering Development Test (EDT) missiles. Additionally, the program will establish pilot line manufacturing processes and validate capabilities to support PrSM production. Demonstration of capabilities through a rigorous test program ensures the Army makes an informed production decision for building missiles beginning in FY 2022. After completion of Milestone B, the Government will award a single EMD phase contract for final Government safety and qualification testing.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Technology Maturation and Risk Reduction (TMRR)	152.573	149.567	78.765
<b>Description:</b> TMRR activities to develop the Army's next generation missile capability that doubles volume of fire, meets range requirements by exceeding 400km, provides required lethality for both point and area targets, ensures survivability, meets cluster munition policy requirements, and provides an open system architecture. PrSM provides field artillery units with a deep-strike capability while supporting Brigade, Division, Corps, Army, Theater, Joint and Coalition forces in full, limited or expeditionary operations.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607134A / Long Range Precision Fires (LRPF)	<b>Project (Number/Name)</b> ES1 / Long Range Precision Fires (LRPF)

<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> Finalized tactical design, completed missile software development and launcher integration, completed prototype missile builds, finalized integration at White Sands Missile Range (WSMR) required to conduct system level flight testing, and completed prototype test flights. Continued build of an additional four (4) missiles to support flight testing in FY 2021. Continued to conduct Hardware in the Loop (HWIL), Software in the Loop (SWIL), and 6 Degrees of Freedom (6DoF) analysis. Completed assessment and implementation of software cybersecurity requirements, begun subsystem qualification, and conducted critical missile survivability assessments. Government continued activities to support missile software integration with the HIMARS fire control system to include required interface with Advanced Field Artillery Tactical Data System (AFATDS). Government continued to assess PrSM performance through modeling, simulation, and performance testing. The Army ensured all efforts support transition to Engineering and Manufacturing Development (EMD) in FY 2021.</p> <p><b><i>FY 2021 Plans:</i></b> Complete execution of TMRR activities to include four (4) PrSM EDT missile flights. One of the flight tests will be a maximum range demonstration. Continue subsystem qualifications, HWIL, SWIL, 6 Degrees of Freedom (6DoF) analysis, and conduct critical missile survivability assessments. Government will continue activities to support PrSM missile software integration with the HIMARS fire control system to include required interface with AFATDS. After the completion of Milestone B, the Product Office will award an EMD contract.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Funding decrease in TMRR funding from FY 2020 to 2021 is attributed to the completion of TMRR phase activities and transition to a single contractor in EMD.</p>			
<p><b><i>Title:</i></b> Engineering Manufacturing Development (EMD)</p> <p><b><i>Description:</i></b> EMD activities to develop the Army's next generation missile capability that doubles volume of fire, meets range requirements by exceeding 400km, provides required lethality for both point and area targets, ensures survivability, meets cluster munition policy requirements, and provides an open system architecture. PrSM provides field artillery units with a deep-strike capability while supporting Brigade, Division, Corps, Army, Theater, Joint and Coalition forces in full, limited or expeditionary operations.</p> <p><b><i>FY 2021 Plans:</i></b> After the completion of Milestone B, the Army will award an EMD. The contractor will identify and implement required design changes informed by TMRR testing, begin any additional sub-assembly system qualification, finalize production planning in support of Manufacturing Readiness Assessments for UMR, and order long lead items for system safety testing and assembly of (12) PQT flight test articles. The Government will continue to assess the contractor's missile performance through modeling,</p>	-	-	43.968

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607134A / Long Range Precision Fires (LRPF)	<b>Project (Number/Name)</b> ES1 / Long Range Precision Fires (LRPF)

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
simulation, and performance testing. The Army will continue tactical software integration on the HIMARS launcher, prioritize required qualification, safety and transportation hazard classification approvals necessary to meet UMR requirements.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> EMD funding increase from FY 2020 to 2021 is attributed to the initiation of EMD in 3Q FY 2021.			
<b>Title:</b> FY 2020 SBIR/STTR Transfer  <b>Description:</b> Funding transferred in accordance with Title 15 USC ?638  <b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638	-	7.115	-
<b>Accomplishments/Planned Programs Subtotals</b>	152.573	156.682	122.733

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

N/A

**Remarks**

**D. Acquisition Strategy**

The PrSM Acquisition Strategy supports development of the Army's next generation surface to surface missile that replaces and improves upon ATACMS capabilities with major improvements in range, effectiveness, lethality, and rate of fire, while meeting insensitive and cluster munition policy requirements. PrSM provides an open system architecture that facilitates future growth. PrSM provides responsive engagement of high value point and area targets by Army and Joint Force Commanders under all weather conditions, at operational ranges defended by enemy air-defense systems. An AoA supporting the MS A decision was completed by U.S. Army Training and Doctrine Command (TRADOC) Analysis Center-White Sands Missile Range (TRAC-WSMR), with an OSD letter of sufficiency issued in September 2015. In 4Q FY 2016, the Army awarded 9 month risk reduction, trade study and initial design development agreements to two contractors. The effort resulted in development of initial baseline designs presented during final technical reviews that resulted in a seamless transition into the TMRR phase. Subsequent to MS A approval on 31 March 2017, the Army awarded TMRR agreements to two contractors. TMRR is ongoing and includes risk reduction activities and further maturation of contractor design concepts. Both contractors participated in a PDR in 1Q FY 2019 to inform design.

In FY 2018, the Army directed acceleration of PrSM capability in response to immediate near-peer threats and the requirement to engage targets with a precision guided missile out to 499km. As a result, the program was restructured to conduct the following key activities previously not planned for in TMRR: finalize tactical designs, build additional missiles for system level EDT flight tests, begin subsystem qualification, and establish a production capability. This approach allows the Army to reduce program risk prior to EMD award, and accelerate an early capability.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607134A / <i>Long Range Precision Fires (LRPF)</i>	<b>Project (Number/Name)</b> ES1 / <i>Long Range Precision Fires (LRPF)</i>

The EMD phase will include assembly of PQT flight test articles in parallel with completion of ground and system qualification, tactical software integration on the HIMARS and M270A2 launch platforms and production planning efforts. Also during this time the program will refine critical missile survivability assessments to ensure the selected EMD design will successfully meet the Army's PrSM kinetic, electro-magnetic spectrum, cyber, environmental, nuclear requirements. The culmination of these efforts will inform a Government CDR planned for 1Q FY 2022 and support of fielding an early capability via Urgent Materiel Release (UMR) in FY23. After the program meets the UMR requirements the remaining EMD phase activities will complete product development, system level qualification, production readiness assessment, and Initial Operational Test and Evaluation (IOT&E).

Beginning in FY 2021 and thru the Future Years Defense Program (FYDP), the Army has programmed Missile Procurement Army (MIPA) funding on line item number 8540C29600. These funds will support initial UMR fielding to close the capability gap between the current capability and near-peer missile capabilities before the program transitions to Full Rate Production (FRP).

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607134A / Long Range Precision Fires (LRPF)	<b>Project (Number/Name)</b> ES1 / Long Range Precision Fires (LRPF)
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<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>			
Government Program Management	MIPR	Various : RSA	6.520	1.819	Nov 2018	0.526	Nov 2019	1.984	Dec 2020	-		1.984	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		7.115		-		-		-	0.000	7.115	-
<b>Subtotal</b>			6.520	1.819		7.641		1.984		-		1.984	Continuing	Continuing	N/A

**Remarks**  
RSA - Redstone Arsenal, Alabama

<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>			
PrSM TMRR - 2 Vendors* (Raytheon and Lockheed Martin)	C/Various	DOTC : Picatinny, NJ	103.153	130.306	Nov 2018	135.869	Nov 2019	56.120	Dec 2020	-		56.120	0.000	425.448	Continuing
PrSM EMD - 1 Vendor	C/FFP	TBD : TBD	-	-		-		43.968	Jun 2021	-		43.968	Continuing	Continuing	Continuing
Development Engineering Support	MIPR	AMCOM/CCDC AvMC/S3I : RSA	4.743	9.988	Nov 2018	9.275	Nov 2019	11.149	Dec 2020	-		11.149	Continuing	Continuing	Continuing
<b>Subtotal</b>			107.896	140.294		145.144		111.237		-		111.237	Continuing	Continuing	N/A

**Remarks**  
\*Lockheed Martin awarded TMRR in 1QFY20 after successful flight test, AMCOM - Aviation and Missile Command; CCDC AvMC - Combat Capabilities Development Center Aviation & Missile Command; DOTC - DoD Ordnance Technology Consortium; OTA - Other Transaction Agreements; S3I - Systems Simulation, Software and Integration; RSA - Redstone Arsenal, Alabama

<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>			
Quality, Safety, Systems Engineering, and Analysis	SS/T&M	Various : RSA	1.829	2.491	Nov 2018	1.270	Nov 2019	2.444	Dec 2020	-		2.444	Continuing	Continuing	Continuing

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607134A / Long Range Precision Fires (LRPF)	<b>Project (Number/Name)</b> ES1 / Long Range Precision Fires (LRPF)
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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>			1.829	2.491		1.270		2.444		-		2.444	Continuing	Continuing	N/A

**Remarks**  
RSA - Redstone Arsenal, AL

<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	MIPR	WSMR; RTC : WSMR,NM; RSA, AL	0.767	7.969	Nov 2018	2.627	Nov 2019	7.068	Dec 2020	-		7.068	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.767	7.969		2.627		7.068		-		7.068	Continuing	Continuing	N/A

**Remarks**  
WSMR, NM - White Sands Missile Range, New Mexico; RTC - Redstone Test Center; RSA - Redstone Arsenal, Alabama

	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>	117.012	152.573	156.682	122.733	-	122.733	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607134A / Long Range Precision Fires (LRPF)	<b>Project (Number/Name)</b> ES1 / Long Range Precision Fires (LRPF)

Event Name	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									
Technology Maturation and Risk Reduction (TMRR) Phase	[Redacted]																																				
TMRR Vendor #1 Contract (DOTC OTA)	[Redacted]																																				
TMRR Vendor #2 Contract (DOTC OTA)	[Redacted]																																				
Preliminary Design Review (PDR)	▲ 1																																				
Prototype Flight Tests																																					
Engineering Development Test (EDT) Component Qualification / Ground Testing																																					
EDT Flight Tests																																					
Critical Design Review (CDR)																																					
Milestone B																																					
Engineering and Manufacturing Development (EMD) Phase																																					
Production Qualification Testing (PQT) Ground / Component / Safety																																					
PQT Flight Tests																																					
Initial Operational Test and Evaluation (IOT&E)																																					



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607134A / Long Range Precision Fires (LRPF)	<b>Project (Number/Name)</b> ES1 / Long Range Precision Fires (LRPF)	

Event Name	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																								
Milestone C / Full Rate Production Decision																									4 ▲																											
Future Spiral Development, Qualification, and Integration																																																				
Initial Operational Capability																									5 ▲																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607134A / Long Range Precision Fires (LRPF)	<b>Project (Number/Name)</b> ES1 / Long Range Precision Fires (LRPF)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
AoA	2	2015	3	2015
Materiel Solution Analysis (MSA)	1	2014	3	2017
MSA Vendor #1 Contract (DOTC OTA)	3	2016	3	2017
MSA Vendor #2 Contract (DOTC OTA)	3	2016	3	2017
Milestone A	2	2017	2	2017
Technology Maturation and Risk Reduction (TMRR) Phase	2	2017	4	2021
TMRR Vendor #1 Contract (DOTC OTA)	3	2017	4	2021
TMRR Vendor #2 Contract (DOTC OTA)	3	2017	4	2021
System Requirements Review (SRR)	4	2017	4	2017
System Functional Review (SFR)	1	2018	1	2018
Preliminary Design Review (PDR)	1	2019	1	2019
Prototype Flight Tests	1	2020	3	2020
Engineering Development Test (EDT) Component Qualification / Ground Testing	3	2020	4	2021
EDT Flight Tests	3	2021	4	2021
Critical Design Review (CDR)	1	2022	1	2022
Milestone B	3	2021	3	2021
Engineering and Manufacturing Development (EMD) Phase	3	2021	4	2024
Production Qualification Testing (PQT) Ground / Component / Safety	4	2021	1	2023
PQT Flight Tests	2	2022	3	2023
Initial Operational Test and Evaluation (IOT&E)	3	2024	4	2024
Milestone C / Full Rate Production Decision	4	2024	4	2024
Future Spiral Development, Qualification, and Integration	1	2022	4	2025

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army			<b>Date:</b> February 2020	
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607134A / Long Range Precision Fires (LRPF)	<b>Project (Number/Name)</b> ES1 / Long Range Precision Fires (LRPF)		

Events	Start		End	
	Quarter	Year	Quarter	Year
Initial Operational Capability	1	2025	1	2025

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					<b>R-1 Program Element (Number/Name)</b> PE 0607135A / Apache Product Improvement Program							
<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	-	22.914	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	22.914
ES2: Apache Product Improvement Program	-	22.914	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	22.914

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

The funding associated with the Apache Product Improvement Program funding line, previously known as Apache Block III, funded the non-recurring engineering (NRE), development, and testing work associated with the planned remanufacture and new build Apache aircraft in the AH-64E configuration (deliveries began in Oct 2011). The AH-64E program consists of two Major Defense Acquisition Programs (MDAP), AH-64E Remanufacture and AH-64E New Build. This project addresses reliability challenges and provides increased combat capability to the aircraft. Upgrades include: Unmanned Aircraft System (UAS) Level III-IV Control, Improved Situational Awareness, Upgraded Communications Suite, Improved Drive and Propulsion Systems, Improved Targeting Capability, Increased Computer Processing Capability and Speed, Improved Navigation Systems, Improved Diagnostics and Maintainability, and Joint Air to Ground Missile (JAGM) integration. Upgrades are integrated as incremental block modifications. The program addresses operational shortfalls identified during real-world combat missions and meets Longbow Apache Capability Production Document (CPD) requirements for modernization.

<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	24.019	0.000	0.000	-	0.000
Current President's Budget	22.914	0.000	0.000	-	0.000
Total Adjustments	-1.105	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.105	-			
• SBIR/STTR Transfer	-	-			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607135A / Apache Product Improvement Program				<b>Project (Number/Name)</b> ES2 / Apache Product Improvement Program			
<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>
ES2: Apache Product Improvement Program	-	22.914	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	22.914
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The funding associated with the Apache Product Improvement Program funding line, previously known as Apache Block III, funded the non-recurring engineering (NRE), development, and testing work associated with the planned remanufacture and new build Apache aircraft in the AH-64E configuration (deliveries began in Oct 2011). The AH-64E program consists of two Major Defense Acquisition Programs (MDAP), AH-64E Remanufacture and AH-64E New Build. This project addresses reliability challenges and provides increased combat capability to the aircraft. Upgrades include: Unmanned Aircraft System (UAS) Level III-IV Control, Improved Situational Awareness, Upgraded Communications Suite, Improved Drive and Propulsion Systems, Improved Targeting Capability, Increased Computer Processing Capability and Speed, Improved Navigation Systems, Improved Diagnostics and Maintainability, and Joint Air to Ground Missile (JAGM) integration. Upgrades are integrated as incremental block modifications. The program addresses operational shortfalls identified during real-world combat missions and meets Longbow Apache Capability Production Document (CPD) requirements for modernization.

**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> Product Development	14.190	-	-	-	-
<b>Description:</b> Funding is provided for the following efforts by Boeing.					
<b>Title:</b> Test and Evaluation	7.289	-	-	-	-
<b>Description:</b> Funding is provided for Development Testing and Evaluation and Operational Test and Evaluation.					
<b>Title:</b> Management Services	1.435	-	-	-	-
<b>Description:</b> Funding is provided for the following effort: Payroll, Travel, Support Contractors, Matrix Support.					
<b>Accomplishments/Planned Programs Subtotals</b>	22.914	-	-	-	-

**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>
• AA6605: AH-64 MODS	104.996	58.172	118.316	-	118.316	84.420	82.084	64.619	4.954	Continuing	Continuing

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607135A / Apache Product Improvement Program	<b>Project (Number/Name)</b> ES2 / Apache Product Improvement Program
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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>
• A05111: AH-64 Apache Block IIIA Reman	927.798	1,010.100	961.487	-	961.487	705.535	678.822	805.508	571.077	Continuing	Continuing
• A05133: AH-64 Apache Block IIIB New Build	510.414	-	0.000	69.154	69.154	-	-	-	-	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

The NRE will encompass subsystem integration and will utilize existing test aircraft, incorporate the technical insertions, and initiate appropriate qualification and operational flight-testing.

In FY 2014, a contract for Apache AH-64E Lot 3, initiating Full Rate Production, was awarded with options for Lot 4.

Training device concurrency will be maintained with each technical insertion. The Engineering/Manufacturing Design (EMD) effort is managed as Cost Reimbursable. Production efforts will be awarded as Fixed Price Incentive (FPI) and include the Advance Procurement requirements.

In FY 2013, FY 2014, and FY 2015 MRL NRE encompassed US Government (USG) design of the Hydra Launcher Electronics Assembly (LEA), modification of the M261 launcher, launcher fabrication, and launcher testing.

In FY 2015-2019, Apache AH-64E Version 6 System Development and Demonstration (SDD) Contract.

Multi-year production awarded March 15, 2017.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607135A / Apache Product Improvement Program	<b>Project (Number/Name)</b> ES2 / Apache Product Improvement Program
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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 (In-House, Travel, etc.)	MIPR	PMO AAH Matrix Support AMCOM Express : Redstone Arsenal, AL	10.852	1.435		-		-		-		-	0.000	12.287	-
<b>Subtotal</b>			10.852	1.435		-		-		-		-	0.000	12.287	N/A

<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			
The Boeing Company	SS/CPIF	Boeing Contracts : Mesa, AZ	216.416	14.190		-		-		-		-	0.000	230.606	-
Longbow Limited Liability (LBL) Contracts	SS/CPIF	Longbow Limited Liability (LBL) Contracts : Orlando, FL	9.000	-		-		-		-		-	0.000	9.000	-
Ground Fire Acquisition Development (GFAD)	SS/CPIF	PM AVIATION SYSTEMS Various Activities : Various	12.000	-		-		-		-		-	0.000	12.000	-
<b>Subtotal</b>			237.416	14.190		-		-		-		-	0.000	251.606	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			
Program Support Activities	MIPR	Various : Various	3.855	-		-		-		-		-	0.000	3.855	-
<b>Subtotal</b>			3.855	-		-		-		-		-	0.000	3.855	N/A





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607135A / Apache Product Improvement Program	<b>Project (Number/Name)</b> ES2 / Apache Product Improvement Program	

Event Name	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
Follow-On Test & Eval II																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607135A / Apache Product Improvement Program	<b>Project (Number/Name)</b> ES2 / Apache Product Improvement Program

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
NRE Contracts - Boeing	1	2011	3	2018
NRE Contracts - Longbow Limited Liability	1	2011	4	2016
MRL PDR	3	2014	3	2014
MRL Prototypes & CDR	1	2015	1	2015
Follow-On Test & Eval I	4	2014	4	2014
MRL Design	3	2013	4	2014
Force Develop Test & Evaluation (FDTE III)	4	2017	4	2017
Follow-On Test & Eval II	3	2019	3	2019
MRL Integration and Test	2	2015	4	2015

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>					<b>R-1 Program Element (Number/Name)</b> PE 0607136A / <i>Blackhawk Product Improvement Program</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	-	33.906	23.039	11.236	-	11.236	5.227	0.000	0.000	0.000	Continuing	Continuing
ES3: <i>Blackhawk Product Improvement Program</i>	-	33.906	23.039	11.236	-	11.236	5.227	0.000	0.000	0.000	Continuing	Continuing

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

**UH-60V:**

The H-60L Digital Blackhawk, now designated as UH-60V, is designed to update the existing H-60L analog architecture to a digital infrastructure enabling the upgraded aircraft to have a similar Pilot-Vehicle Interface (PVI) to the H-60M. The program will address current capability gaps and meet operational requirements by employing an evolutionary acquisition approach to leverage mature technologies that have been successfully integrated on other military aircraft. The program will reduce obsolescence and increase commonality and interoperability by installing a digital cockpit, bussing and upgrading the communication/identification suite, improving navigation guidance, and integrating Aircraft Survivability Equipment (ASE), digital moving map, and Joint Variable Message Format (JVMF) messaging. Continuing funding will provide hardware and software development, training material development, as well as developmental and operational testing.

**MEDEVAC:**

Beginning in Fiscal Year (FY) 2019, Research Development Technology & Evaluation (RDT&E) funding will also support non-recurring engineering to integrate and qualify MEDEVAC Mission Equipment Package (MEP) into the UH-60V Black Hawk helicopter. This MEDEVAC MEP integration effort is independent of the UH-60V Program of Record and Acquisition Program Baseline (APB). The Surgeon General (TSG) has a requirement for a MEDEVAC capability provided by Black Hawk helicopters that were not initially produced for MEDEVAC, but are designated to support the MEDEVAC mission. In accordance with AR 40-60 Medical Materiel Acquisition Policy, the Program Executive Office for Aviation (PEOAVN) is responsible for the costs associated with medical MEP integration on Black Hawk helicopters that were not initially produced for MEDEVAC, but require medical MEP modifications/upgrades to support the MEDEVAC mission. MEDEVAC MEP integration on the UH-60V will address obsolescence and reduce the logistics footprint by increasing equipment commonality across the MEDEVAC fleet and will reduce the number of Black Hawk MEDEVAC configurations. Additionally, UH-60V MEDEVAC capabilities will increase when comparing MEDEVAC MEP integration on legacy Black Hawk helicopters. Capability improvements will include simultaneous Rescue Hoist and extended range capability, enabled MEDEVAC Mission Sensor (MMS) use in Arctic conditions, UH-60V Multi-Function Display (MFD) integrated MMS video, and Multi-Function Controller Unit (MFCU) integration of MMS functions.

Independent of the UH-60V Program of Record and Acquisition Program Baseline (APB), incremental RDT&E funding to support integration of a MEDEVAC capability on UH-60V is planned for FY 2019-2022. In accordance with AR 40-60, Medical Materiel Acquisition Policy, the Army's Aeromedical Evacuation capability is funded by two portfolio managers, PEOAVN and the Medical Research Development Command, MRDC. PEOAVN is responsible for the integration of MEDEVAC MEP on the UH-60V. MRDC is responsible for recurring costs to procure kits and resource the installation of MEP kits on UH-60V MEDEVAC helicopters.

**SATCOM:**

Development and Integration of an airworthiness satellite communications for better coordination, information sharing and situational awareness/situational understanding on UH/HH-60 aircraft.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607136A / <i>Blackhawk Product Improvement Program</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	35.196	13.039	11.247	-	11.247
Current President's Budget	33.906	23.039	11.236	-	11.236
Total Adjustments	-1.290	10.000	-0.011	-	-0.011
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	10.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.290	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.011	-	-0.011

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607136A / <i>Blackhawk Product Improvement Program</i>				<b>Project (Number/Name)</b> ES3 / <i>Blackhawk Product Improvement Program</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>
ES3: <i>Blackhawk Product Improvement Program</i>	-	33.906	23.039	11.236	-	11.236	5.227	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

**UH-60V:**

The H-60L Digital Blackhawk, now designated as UH-60V, is designed to update the existing H-60L analog architecture to a digital infrastructure enabling the upgraded aircraft to have a similar Pilot-Vehicle Interface (PVI) to the H-60M. The program will address current capability gaps and meet operational requirements by employing an evolutionary acquisition approach to leverage mature technologies that have been successfully integrated on other military aircraft. The program will reduce obsolescence and increase commonality and interoperability by installing a digital cockpit, bussing and upgrading the communication/identification suite, improving navigation guidance, and integrating Aircraft Survivability Equipment (ASE), digital moving map, and Joint Variable Message Format (JVMF) messaging. Continuing funding will provide hardware and software development, training material development, as well as developmental and operational testing.

**MEDEVAC:**

Beginning in Fiscal Year (FY) 2019, Research Development Technology & Evaluation (RDT&E) funding will also support non-recurring engineering to integrate and qualify MEDEVAC Mission Equipment Package (MEP) into the UH-60V Black Hawk helicopter. This MEDEVAC MEP integration effort is independent of the UH-60V Program of Record and Acquisition Program Baseline (APB). The Surgeon General (TSG) has a requirement for a MEDEVAC capability provided by Black Hawk helicopters that were not initially produced for MEDEVAC, but are designated to support the MEDEVAC mission. In accordance with AR 40-60 Medical Materiel Acquisition Policy, the Program Executive Office for Aviation (PEOAVN) is responsible for the costs associated with medical MEP integration on Black Hawk helicopters that were not initially produced for MEDEVAC, but require medical MEP modifications/upgrades to support the MEDEVAC mission. MEDEVAC MEP integration on the UH-60V will address obsolescence and reduce the logistics footprint by increasing equipment commonality across the MEDEVAC fleet and will reduce the number of Black Hawk MEDEVAC configurations. Additionally, UH-60V MEDEVAC capabilities will increase when comparing MEDEVAC MEP integration on legacy Black Hawk helicopters. Capability improvements will include simultaneous Rescue Hoist and extended range capability, enabled MEDEVAC Mission Sensor (MMS) use in Arctic conditions, UH-60V Multi-Function Display (MFD) integrated MMS video, and Multi-Function Controller Unit (MFCU) integration of MMS functions.

Independent of the UH-60V Program of Record and Acquisition Program Baseline (APB), incremental RDT&E funding to support integration of a MEDEVAC capability on UH-60V is planned for FY 2019-2022. In accordance with AR 40-60, Medical Materiel Acquisition Policy, the Army's Aeromedical Evacuation capability is funded by two portfolio managers, PEOAVN and the Medical Research Development Command, MRDC. PEOAVN is responsible for the integration of MEDEVAC MEP on the UH-60V. MRDC is responsible for recurring costs to procure kits and resource the installation of MEP kits on UH-60V MEDEVAC helicopters.

**SATCOM:**

Development and Integration of an airworthiness satellite communications for better coordination, information sharing and situational awareness/situational understanding on UH/HH-60 aircraft

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607136A / <i>Blackhawk Product Improvement Program</i>	<b>Project (Number/Name)</b> ES3 / <i>Blackhawk Product Improvement Program</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> UH-60V Product Development</p> <p><b>Description:</b> The UH-60V program provides an integrated digital map, integrated performance planning, common functionality and commonality of training with UH-60M. Product Development includes all activities related to Hardware and Software development, Prototype Manufacturing (3 units), Training Equipment, Data, and Production Engineering and Planning for the UH60V program. Examples of specific activities include drawing development, work instruction development, prototype builds, Preliminary Design Review (PDR)/Critical Design Review (CDR), Software Engineering Directorate (SED) Simulation Integration Laboratory (SIL) design, Software Development (aircraft and off aircraft), trainers, and training material development.</p> <p><b>FY 2020 Plans:</b> Continued 60V Engineering and Manufacturing Development (EMD) efforts including hardware development and Prototype Integration Facility (PIF) labor in support of 60V development.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No FY 2021 funding request due to the close out of UH-60V Development Activities.</p>	8.486	1.179	-	-	-
<p><b>Title:</b> UH-60V Support</p> <p><b>Description:</b> Support Costs include Systems Engineering/Program Management (SEPM) type activities performed at the PIF. This includes Army Engineering Directorate (AED) support for propulsion, structures, aeromechanics, mission equipment, as well as PIF program management.</p> <p><b>FY 2020 Plans:</b> Continued AED support for propulsion, structures, aeromechanics, mission equipment, SED SIL Support, Air Worthiness Release (AWR), and Logistics Demonstration as well as PIF program management.</p> <p><b>FY 2021 Base Plans:</b> Support of UH-60V Publication and Verification post Initial Operational Test and Evaluation (IOT&amp;E).</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 funding decrease is due to the closing out of UH-60V Development Activities.</p>	3.348	1.349	0.424	-	0.424
<p><b>Title:</b> UH-60V Management Services</p> <p><b>Description:</b> Management Services includes all activities related to Government/Contractor SEPM to include the cost of Government and Contractor personnel supporting the UH-60V program.</p>	1.145	0.681	0.126	-	0.126

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607136A / <i>Blackhawk Product Improvement Program</i>	<b>Project (Number/Name)</b> ES3 / <i>Blackhawk Product Improvement Program</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>FY 2020 Plans:</b> Continued core and contractor SEPM activities in support of UH-60V.</p> <p><b>FY 2021 Base Plans:</b> UH-60V Publication and Verification post IOT&amp;E.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 funding decrease is due to the closing out of UH-60V Development Activities.</p>					
<p><b>Title:</b> UH-60V Test &amp; Evaluation</p> <p><b>Description:</b> The Utility Helicopters Project Office (UHPO) is responsible for day-to-day test management activities to include execution of all developmental tests and support of operational tests for the UH-60V Program. The focal point for test management is the UH-60V Test Lead Engineer who is the chair for the UH-60V Test and Evaluation (T&amp;E) Working-level Integrated Product Team. The UH-60 T&amp;E team ensures integration and coordination of test and data requirements among all agencies involved in the test and acquisition of the UH-60V effort. T&amp;E activities include: AFTD Baseline Flight Testing, IOTE, Cybersecurity and Interoperability tests.</p> <p><b>FY 2020 Plans:</b> Electromagnetic Vulnerability (EMV) testing and evaluation.</p> <p><b>FY 2021 Base Plans:</b> UH-60V Publication and Verification post IOT&amp;E.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 funding decrease is due to the closing out of UH-60V Development Activities.</p>	4.475	1.603	1.021	-	1.021
<p><b>Title:</b> MEDEVAC MEP Integration Product Development</p> <p><b>Description:</b> MEDEVAC MEP Integration Product Development.</p> <p><b>FY 2020 Plans:</b> Continued executing contract with PIF Contractor to perform Hardware (HW) design and Software (SW) Design activities for H-60V MEDEVAC MEP Integration effort.</p> <p><b>FY 2021 Base Plans:</b></p>	14.131	5.383	4.886	-	4.886

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607136A / <i>Blackhawk Product Improvement Program</i>	<b>Project (Number/Name)</b> ES3 / <i>Blackhawk Product Improvement Program</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 executing contract with PIF Contractor to perform HW design and SW Design activities for H-60V MEDEVAC MEP Integration effort.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Cost decrease due to transitioning to Test and Evaluation.					
<b>Title:</b> MEDEVAC MEP Integration Support					
<b>Description:</b> Support the HW and SW Design Activities with Airworthiness and Technical data division support.					
<b>FY 2020 Plans:</b> Supported the HW and SW Design Activities with Airworthiness and Technical data division support.					
<b>FY 2021 Base Plans:</b> Support the hardware and software Design Activities with Airworthiness and Technical data division support.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase in funding from FY 2020 to FY 2021 due to economic adjustments.					
	0.592	0.518	0.592	-	0.592
<b>Title:</b> MEDEVAC MEP Management Services					
<b>Description:</b> Management Services includes all activities related to Government/Contractor SEPM to include the cost of Government and Contractor personnel supporting the H-60V MEDEVAC MEP Integration Program.					
<b>FY 2020 Plans:</b> Provided Management Services with Government / Contractor SEPM to include the cost of the Government and contractor personnel supporting the H-60V MEDEVAC MEP Integration Program.					
<b>FY 2021 Base Plans:</b> Provide Management Services with Government / Contractor SEPM to include the cost of the Government and contractor personnel supporting the H-60V MEDEVAC MEP Integration Program.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Cost decrease due to the transition from Product Development to Test and Evaluation and Logistics activities.					
	1.729	1.808	1.662	-	1.662
<b>Title:</b> MEDEVAC Test & Evaluation					
<b>Description:</b> The UHPO is responsible for Day-to-day test management activities to include the execution of all developmental tests for the UH-60V MEDEVAC Program. As part of this responsibility, UHPO manages the Test and Evaluation working group with a UH-60V MEDEVAC Test lead. They ensure the test agencies are					
	-	-	2.525	-	2.525



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607136A / <i>Blackhawk Product Improvement Program</i>	<b>Project (Number/Name)</b> ES3 / <i>Blackhawk Product Improvement Program</i>

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>coordinated, test plans are created, instrumentation is developed and installed and airworthiness approvals are obtained. They status the testing throughout the program, assist in resolving issues, and coordinate approval of the test data and test reports. For this effort the UHPO will manage system level testing necessary to receive a fielding AWR, including aircraft level Electromagnetic Compatibility (EMC) Testing, Noise Floor Testing, Electromagnetic Vulnerability (EMV) Testing, Ground system checkouts of the FLIR, Hoist and IMMSS, and Flight testing of the FLIR, Hoist and IMMSS.</p> <p><b>FY 2021 Base Plans:</b> MEDEVAC plans to implement funding at the Redstone Test Center (RTC) to perform aircraft level EMC, noise floor, EMV and flight testing. The flight testing will focus on proper operation of the FLIR and the new Pilot Vehicle Interface (PVI) for the FLIR / Geopoint &amp; Geolocate functionality. It will also focus on safe operation of the hoist with payload. This effort will be managed by UHPO PD MEDEVAC.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> MEDEVAC Test and Evaluation begins in FY 2021.</p>					
<p><b>Title:</b> SATCOM</p> <p><b>Description:</b> SATCOM: Development and Integration of an airworthiness satellite communications for better coordination, information sharing and situational awareness/situational understanding on UH/HH-60 aircraft</p> <p><b>FY 2020 Plans:</b> Integration and airworthiness of SATCOM solution on the UH/HH-60 aircraft.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No FY 2021 funding requested due to the closeout of the SATCOM integration and development activities.</p>	-	9.926	-	-	-
<p><b>Title:</b> FY 2020 SBIR/STTR Transfer</p> <p><b>Description:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>	-	0.592	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607136A / <i>Blackhawk Product Improvement Program</i>	<b>Project (Number/Name)</b> ES3 / <i>Blackhawk Product Improvement Program</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>
Funding transferred in accordance with Title 15 USC 7638					
<b>Accomplishments/Planned Programs Subtotals</b>	33.906	23.039	11.236	-	11.236

<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>
• A05009: <i>UH-60 Black Hawk L and V Models</i>	148.138	169.290	172.797	-	172.797	173.460	174.482	153.116	156.614	0.000	1,147.897
• MN1000: <i>Combat Support Medical</i>	102.765	101.351	59.485	6.390	65.875	97.194	44.114	74.823	81.457	0.000	567.579

**Remarks**  
 MN1000, MEDEVAC MEP provides procurement funding for MEDEVAC MEP capability on UH-60 helicopters. Per requirements, starting in FY 2022, MN1000 will resource procurement of MEDEVAC MEP kits and installations at a rate of 15 aircraft per year through FY 2034, which is the estimated year the AAO of 200 UH-60V MEDEVAC is reached. Figures shown above reflect the full MN1000 - OPA3/MN1000/Combat Support Medical funding line, which includes the production kits and MEP installation costs at CCAD. UH-60V MEDEVAC MEP MN1000 OPA requirements are \$5.7 million in FY 2022, \$6.1 million in FY 2023, and \$6.1 million in FY 2024. Total MEDEVAC MEP requirement in MN1000 through FY 2034 is \$88.1M.

**D. Acquisition Strategy**  
 The UH-60V program plans to leverage the Prototype Integration Facility (PIF), a Government Owned Government Operated (GOGO) facility, to design, integrate and build three production representative aircraft. The GOGO facility uses a cost plus contract vehicle and conducted full and open competition for the selection of the avionics solution provider.

Independent of the UH-60V Program of Record and Acquisition Program Baseline (APB), the MEDEVAC MEP program plans to utilize the U. S. Army Combat Capabilities Development Command (CCDC) Aviation and Missile Center (AvMC) and PIF to design and integrate MEDEVAC capability into the UH-60V. By leveraging the same GOGO facility utilized by the UH-60V program, efficient design, software development, integration, and testing will occur by eliminating redundant tasks and employing experienced government resources already in possession of pertinent UH-60V technical data required to support the MEDEVAC MEP non-recurring engineering (NRE) effort. Prototype, validation, and verification of technical publications, as well as airworthiness testing will be accomplished following completion of the UH-60V IOT&E, at which time up to two UH-60V EDM aircraft will be allocated to the MEDEVAC MEP program. Following completion of MEDEVAC MEP NRE, technical products will feed production and fielding contracts, which will be resourced by the U.S. Army Medical Department, AMEDD. Procurement funding is programmed on MN1000 Combat Support Medical, G13010 MEDEVAC MEP.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607136A / <i>Blackhawk Product Improvement Program</i>	<b>Project (Number/Name)</b> ES3 / <i>Blackhawk Product Improvement Program</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			
UH-60V - Organic	MIPR	Various : Redstone Arsenal, AL	11.448	0.483	Oct 2018	0.246	Oct 2019	0.126	Oct 2020	-		0.126	0.000	12.303	-
UH-60V - Contractor	C/LH	Various : Redstone Arsenal, AL	8.985	0.662	Oct 2018	0.391	Oct 2019	-		-		-	0.000	10.038	-
MEDEVAC MEP Integration - Organic	MIPR	Various : Redstone Arsenal	-	1.024	Oct 2018	0.985	Oct 2019	1.033	Oct 2020	-		1.033	Continuing	Continuing	-
MEDEVAC MEP Integration - Contractor	C/LH	Various : Redstone Arsenal, AL	-	0.705	Oct 2018	0.777	Oct 2019	0.629	Oct 2020	-		0.629	Continuing	Continuing	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.592		-		-		-	0.000	0.592	-
<b>Subtotal</b>			20.433	2.874		2.991		1.788		-		1.788	Continuing	Continuing	N/A

<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			
UH-60V Development Engineering	C/CPFF	CCDC AvMC, PIF : Redstone Arsenal, AL	160.791	8.486	Oct 2018	1.194	Oct 2019	-		-		-	0.000	170.471	-
MEDEVAC MEP Product Development and Integration	C/CPFF	CCDC AvMC, PIF : Redstone Arsenal AL	-	14.131	Oct 2018	5.398	Oct 2019	4.886	Oct 2020	-		4.886	Continuing	Continuing	-
SATCOM	TBD	To Be Determined : Redstone Arsenal AL	-	-		9.941	Jul 2020	-		-		-	0.000	9.941	-
<b>Subtotal</b>			160.791	22.617		16.533		4.886		-		4.886	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			
UH-60V	MIPR	Various : Redstone Arsenal, AL	12.785	3.348	Oct 2018	1.364	Oct 2019	0.424	Oct 2020	-		0.424	0.000	17.921	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607136A / <i>Blackhawk Product Improvement Program</i>	<b>Project (Number/Name)</b> ES3 / <i>Blackhawk Product Improvement Program</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			
MEDEVAC MEP Integration Support	MIPR	Various : Redstone Arsenal AL	-	0.592	Oct 2018	0.533	Oct 2019	0.592	Oct 2020	-		0.592	Continuing	Continuing	-
<b>Subtotal</b>			12.785	3.940		1.897		1.016		-		1.016	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			
UH-60V	MIPR	Redstone Test Center : Redstone Arsenal, AL	11.615	4.475	Oct 2018	1.618	Oct 2019	1.021	Oct 2020	-		1.021	0.000	18.729	-
MEDEVAC	MIPR	Redstone Test Center : Redstone Arsenal, AL	-	-		-		2.525	Oct 2020	-		2.525	Continuing	Continuing	-
<b>Subtotal</b>			11.615	4.475		1.618		3.546		-		3.546	Continuing	Continuing	N/A

**Remarks**  
Government 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>	205.624	33.906	23.039	11.236	-	11.236	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607136A / <i>Blackhawk Product Improvement Program</i>	<b>Project (Number/Name)</b> ES3 / <i>Blackhawk Product Improvement Program</i>	

Event Name	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
UH-60V Development (Research, Development, Test, and Evaluation)	UH-60V EMD (Product Development)																											
UH-60V Support (RDTE)	Support																											
UH-60V Test and Evaluation (RDTE)	Test and Evaluation																											
UH-60V Management Services (RDTE)	Management Services																											
UH-60V Future Integration Efforts (RDTE)									Integration																			
UH-60V Digital Modifications (Low Rate Initial Production (LRIP))	UH-60V LRIP																											
UH-60V Digital Modifications Full Rate Production (APA) (FY22-FY36)													UH-60V Production (FY22-FY36)															
MEDEVAC MEP Integration Management Services (RDTE)	MEDEVAC MEP Integration Management Services																											
MEDEVAC MEP Product Development and Integration (RDTE)	MEDEVAC MEP Product Development and Integration																											
MEDEVAC MEP Integration Support (RDTE)					MEDEVAC MEP Integration Support																							
MEDEVAC MEP Integration Test and Evaluation (RDTE)									MEDEVAC MEP Integration Test and Evaluation																			
Satellite Communications Integration Development									SATCOM Integration Development																			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607136A / <i>Blackhawk Product Improvement Program</i>	<b>Project (Number/Name)</b> ES3 / <i>Blackhawk Product Improvement Program</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
UH-60V Development (Research, Development, Test, and Evaluation (RDTE))	4	2014	4	2020
UH-60V Support (RDTE)	1	2014	4	2021
UH-60V Test and Evaluation (RDTE)	4	2015	4	2021
UH-60V Management Services (RDTE)	1	2014	4	2021
UH-60V Future Integration Efforts (RDTE)	1	2021	4	2022
UH-60V Digital Modifications (Low Rate Initial Production (LRIP); (APA))	4	2018	4	2021
UH-60V Digital Modifications Full Rate Production (APA) (FY22-FY36)	1	2022	4	2036
MEDEVAC MEP Integration Management Services (RDTE)	1	2019	4	2022
MEDEVAC MEP Product Development and Integration (RDTE)	1	2019	4	2022
MEDEVAC MEP Integration Support (RDTE)	4	2019	4	2022
MEDEVAC MEP Integration Test and Evaluation (RDTE)	2	2021	4	2022
Satellite Communications Integration Development	4	2020	4	2021

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0607137A / Chinook Product Improvement Program
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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	-	139.003	171.471	46.091	-	46.091	2.050	1.998	1.020	2.164	Continuing	Continuing
ES4: Chinook Product Improvement Program	-	139.003	171.471	46.091	-	46.091	2.050	1.998	1.020	2.164	Continuing	Continuing

**Program MDAP/MAIS Code:** 577

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

Program Element (PE) 0607137A Chinook Product Improvement Program is critical to achieving the Army's heavy lift Multi-Domain Operational capability. With an increased payload and operational reach, the CH-47F Block II is the only platform that can lift the JLTV, M777 and medium girder bridge to enable Multi-Domain Forces to Compete, Penetrate, Disintegrate, and Exploit at operationally relevant distances.

The CH-47F Block II acquisition program upgrades existing CH-47F aircraft and procures common hardware that exists between the CH-47F and MH-47G aircraft for Special Operations Forces. The CH-47F Block II program provides additional capability to the field with greater reach, increased payload capability and an increase in maximum gross weight to 54,000 pounds. These improvements are based on airframe and subcomponent changes. Specifically, the Advanced Chinook Rotor Blades will increase lift in high-hot conditions while improved flight control and drive train components will both increase aircraft performance and reduce O&S costs. The program updates the Common Avionics Architecture System and Digital Advanced Flight Control System systems of the aircraft and incorporates other avionics changes introduced into the final CH-47F production lots. CH-47F Block II will also include a strengthened airframe which introduces commonality with the MH-47G and improvements to rotor, fuel, and electrical systems which will improve safety and reliability for the aircraft. Along with providing a significantly increased capability to the field, the program includes provisions for anticipated future upgrades as well as weight and cost savings initiatives to ensure the Army has a platform with the flexibility and performance needed to meet the needs of Multi-Domain Operations until a Heavy Future Vertical Lift variant is fielded.

The Cargo Project Management Office awarded the CH-47F Engineering and Manufacturing Development (EMD) contract in July 2017. The EMD phase will produce three production representative test articles to support a Milestone C decision in the 4th quarter of Fiscal Year (FY) 2021. This phase will include contractor and government led system level qualification testing. The contractor led system level qualification testing includes both ground and flight test. The government led system level qualification testing includes Electromagnetic Environmental Effects (E3), Limited User Test (LUT) and aircraft subsystem Live-Fire Test and Evaluation (LFTE).

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607137A / <i>Chinook Product Improvement Program</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	144.722	174.371	46.136	-	46.136
Current President's Budget	139.003	171.471	46.091	-	46.091
Total Adjustments	-5.719	-2.900	-0.045	-	-0.045
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-12.700			
• Congressional Rescissions	-	-			
• Congressional Adds	-	9.800			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-5.719	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.045	-	-0.045

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

**Project:** ES4: *Chinook Product Improvement Program*

Congressional Add: *Program Increase - Expandable Rotorcraft Diagnostics*

Congressional Add: *Program increase - Block II Lightweight Improvements*

	<b>FY 2019</b>	<b>FY 2020</b>
	-	3.300
	-	6.500
Congressional Add Subtotals for Project: ES4	-	9.800
Congressional Add Totals for all Projects	-	9.800



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607137A / <i>Chinook Product Improvement Program</i>					<b>Project (Number/Name)</b> ES4 / <i>Chinook Product Improvement Program</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>
ES4: <i>Chinook Product Improvement Program</i>	-	139.003	171.471	46.091	-	46.091	2.050	1.998	1.020	2.164	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Program Element (PE) is critical to achieving the Army's heavy lift Multi-Domain Operational capability. With an increased payload and operational reach, the CH-47F Block II is the only platform that can lift the JLTV, M777 and medium girder bridge to enable Multi-Domain Forces to Compete, Penetrate, Disintegrate, and Exploit at operationally relevant distances.

The CH-47F Block II acquisition program upgrades existing CH-47F aircraft and procures common hardware that exists between the CH-47F and MH-47G aircraft for Special Operations Forces. The CH-47F Block II program provides additional capability to the field with greater reach, increased payload capability and an increase in maximum gross weight to 54,000 pounds. These improvements are based on airframe and subcomponent changes. Specifically, the Advanced Chinook Rotor Blades will increase lift in high-hot conditions while improved flight control and improved drive train components will both increase performance and reduce O&S costs. The program updates the Common Avionics Architecture System and Digital Advanced Flight Control System systems of the aircraft and incorporates other avionics changes introduced into the final CH-47F production lots. CH-47F Block II will also include a strengthened airframe which introduces commonality with the MH-47G and improvements to rotor, fuel and electrical systems which will improve safety and reliability for the aircraft. Along with providing a significantly increased capability to the field, the program includes provisions for anticipated future upgrades as well as weight and costs savings initiatives to ensure the Army has a platform with the flexibility and performing needed to meet the needs of Multi-Domain Operations until a Heavy Future Vertical Lift variant is fielded.

The Cargo Project Management Office awarded the CH-47F Engineering and Manufacturing Development (EMD) contract in July 2017. The EMD phase will produce three production representative test articles to support a Milestone C decision in the 4th quarter of Fiscal Year (FY) 2021. This phase will include contractor and Government led system level qualification testing. The contractor led system level qualification testing includes both ground and flight test. The Government led system level qualification testing includes Electromagnetic Environmental Effects (E3), Limited User Test (LUT) and aircraft subsystem Live-Fire Test and Evaluation (LFTE).

**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> Improved Drive Train (IDT)	9.471	7.587	-	-	-
<b>Description:</b> This effort modernizes the CH-47 drive train by implementing design changes to operate at a higher power level to maximize engine power available, increase performance and restore payload lost through mission equipment package (MEP) growth. Additionally, this effort addresses Operations and Support (O&S) cost reductions while fully qualifying the improved drive train at the component level.					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607137A / <i>Chinook Product Improvement Program</i>	<b>Project (Number/Name)</b> ES4 / <i>Chinook Product Improvement Program</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><i>FY 2020 Plans:</i></b> Performed contractor led component qualification to support forward and aft rotor shaft fatigue testing. Documented test results to support full airworthiness component qualification. Additionally, this testing identified component useful life necessary to support flight test.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> The FY 2021 decrease of \$7.587 is due to the completion of IDT component qualification testing.</p>					
<p><b><i>Title:</i></b> Transportable Flight Proficiency Simulator (TFPS)</p> <p><b><i>Description:</i></b> The Transportable Flight Proficiency Simulator (TFPS) is a certified transportable flight trainer featuring a high fidelity visual display, detailed cockpit representation and motion cueing seats. It is capable of training mission tasks and emergency procedures and provides a cost savings when compared to using aircraft for these purposes. The TFPS will increase safety and mitigate risk to Block II Limited User Test (LUT) aircrews by allowing pilots to train aircraft differences in modifications, handling qualities, performance and human factors considerations before actual flight is performed. Training in the TFPS reduces LUT timelines and improves aircrew proficiency as confirmed in the CH-47F (Block I) Phase 2 User Test Report. The initial Block II TFPS will also serve as building block for upgrading the fielded TFPSs to the Block II configuration.</p> <p><b><i>FY 2020 Plans:</i></b> Built, certified, tested, and relocated the Transportable Flight Proficiency Simulator to prepare for training.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> The FY2021 decrease of \$1.000 is due to the delivery of the initial Block II TFPS.</p>	12.300	1.000	-	-	-
<p><b><i>Title:</i></b> CH-47F Block II Engineering and Manufacturing Development (EMD)</p> <p><b><i>Description:</i></b> Conduct and support aircraft development, complete assembly and deliver three EMD test articles to include Advanced Chinook Rotor Blade (ACRB), airframe components, Improved Drive Train (IDT), rotor components, light weight fuel system and electrical components. Complete fabrication, assembly, initial functional checks of the Ground Test Vehicle (GTV) and remote control system (RCS), conduct GTV test operations, functional testing of the CH-47F Block II systems, Test Readiness Review (TRR) for EMD ground and flight testing. Release EMD flight test software. Begin contractor led system level ground and flight testing. Deliver documentation that demonstrates requirements verification and production configuration baseline. Continue Integrated Logistics Support (ILS) and Integrated Contractor Supply (ICS) support for initial flight test activities.</p>	89.749	112.485	20.763	-	20.763

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607137A / <i>Chinook Product Improvement Program</i>	<b>Project (Number/Name)</b> ES4 / <i>Chinook Product Improvement Program</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><i>FY 2020 Plans:</i></b> Continued Engineering and Manufacturing Development (EMD) system level ground and flight testing to support full airworthiness qualification. Developed technical publications, provisioning and training for operators and maintainers. Developed material solutions and fielding plan for ground support equipment. Performed maintenance demonstration, requirements traceability and system verification. Utilized the Ground Test Vehicle (GTV) to support dynamic live fire testing.</p> <p><b><i>FY 2021 Base Plans:</i></b> Finalize system and component level qualification testing. Receipt and disposition of all contract requirements to include test reports, qualification by similarity (QBS), Integrated Logistics Support (ILS) and Integrated Contractor Supply (ICS) deliverables, and delivery of Production Configuration Baseline.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> The FY 2021 decrease of \$91.722 million is due to the completion of the bulk of scheduled Non-Recurring Engineering (NRE), completion of ground and flight testing at multiple off-site locations, reduction in manpower and material to support ground and flight testing, and the delivery of contract deliverable data and files supporting these activities.</p>					
<p><b><i>Title:</i></b> Matrix and Contractor Support</p> <p><b><i>Description:</i></b> This funding provides support costs for various government agencies, contractor support and matrix organizations supporting the Block II Engineering and Manufacturing Development (EMD) program with systems engineering, test support, airworthiness certification, project management, general engineering, logistics and business support.</p> <p><b><i>FY 2020 Plans:</i></b> Continued funding support costs for various government agencies, contractor support, and other matrix organizations supporting the Block II EMD Program.</p> <p><b><i>FY 2021 Base Plans:</i></b> Continues funding support costs for various government agencies, contractor support, and other matrix organizations supporting the Block II EMD Program.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> The FY 2020 decrease of \$2.927 aligns support requirements for FY21 approved development activities.</p>	7.163	6.738	3.811	-	3.811
<p><b><i>Title:</i></b> Advanced Chinook Rotor Blade (ACRB)</p>	9.858	8.619	13.300	-	13.300

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607137A / <i>Chinook Product Improvement Program</i>	<b>Project (Number/Name)</b> ES4 / <i>Chinook Product Improvement Program</i>

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><b>Description:</b> This effort designs, develops and performs contractor led component qualification for an improved rotor blade capability. This capability significantly increases lift capability, reduces Operation and Support (O&amp;S) costs and is a form, fit replacement for the current blade, which will enable payload restoration to the ground force commander. Conduct additional flight testing to reduce risk for Engineering and Manufacturing Development (EMD) and validate Computational Fluid Dynamics (CFD) and Computational Structural Dynamics (CSD) models.</p> <p><b>FY 2020 Plans:</b> Conducted engineering analysis of Advanced Chinook Rotor Blade (ACRB) design changes resulting from Block II flight testing. Continued structural testing and development of material allowables in support of ACRB full component qualification.</p> <p><b>FY 2021 Base Plans:</b> Conduct engineering updates at completion of flight test for final design of the Advanced Chinook Rotor Blade (ACRB). Develop material allowables in support of ACRB full component qualification. Build qualification blades in support of full qualification testing.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The 2020 increase of \$4.681 is due to engineering updates, blade build and full component qualification testing.</p>					
<p><b>Title:</b> Testing and Evaluation</p> <p><b>Description:</b> This effort supports component and system level testing to qualify design improvements in the airframe, fuel system, avionics, drive train, rotor subsystem, and Advanced Chinook Rotor Blade (ACRB). Block II improvements will be validated through component endurance, testing of IDT, IRS, Live Fire Test and Evaluation (LFTE), Electromagnetic Environmental Effects (E3), Limited User Test (LUT), and developmental flight test activities.</p> <p><b>FY 2020 Plans:</b> Transitioned from contractor led flight testing to government led flight testing of three production representative test aircraft for system level performance and airworthiness qualification. Continued Advanced Chinook Rotor Blade (ACRB) live fire testing and conduct system level live fire testing at Army Research Laboratory (ARL). Concluded system level Electromagnetic Environmental Effects (E3) and ground developmental testing. Completed coordination and initiated execution support for Limited User Test (LUT).</p> <p><b>FY 2021 Base Plans:</b></p>	10.452	18.591	8.217	-	8.217

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607137A / Chinook Product Improvement Program	<b>Project (Number/Name)</b> ES4 / Chinook Product Improvement Program
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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
Complete the Limited User Test activities. Maintain GTV for operational use and complete all remaining Live Fire activities. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 decrease of \$10.374 as planned due to completion of the majority of EMD flight test qualification prior to the execution of the Limited User Test (LUT).					
<b>Title:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun <b>Description:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun	0.010	-	-	-	-
<b>Title:</b> FY 2020 SBIR/STTR Transfer <b>Description:</b> Funding transferred in accordance with Title 15 USC ?638 <b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638 <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638	-	6.651	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	139.003	161.671	46.091	-	46.091

	FY 2019	FY 2020
<b>Congressional Add:</b> Program Increase - Expandable Rotorcraft Diagnostics <b>FY 2020 Plans:</b> Program Increase - Expandable Rotorcraft Diagnostics	-	3.300
<b>Congressional Add:</b> Program increase - Block II Lightweight Improvements <b>FY 2020 Plans:</b> Program increase - Block II Lightweight Improvements	-	6.500
<b>Congressional Adds Subtotals</b>	-	9.800

<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>
• A05105: CH-47 SLEP	140.056	177.137	179.122	-	179.122	165.933	183.503	194.159	196.538	Continuing	Continuing
• A05008: CH-47 NEW BUILD	-	25.000	0.000	50.472	50.472	-	-	-	-	0.000	75.472

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607137A / <i>Chinook Product Improvement Program</i>	<b>Project (Number/Name)</b> ES4 / <i>Chinook Product Improvement Program</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**

100% of the A05105 is Army Common MH-47G RENEW Block II procurement.  
 FY 2020 A05008 OCO is Army Common MH-47G New Build War Replacement Aircraft Block II procurement.  
 FY 2021 A05008 OCO is CH-47F New Build War Replacement Aircraft procurement.

**D. Acquisition Strategy**

The Cargo Program Management Office (PMO) is executing a block strategy to facilitate incremental upgrades to ensure performance necessary to meet the needs of the Multi-Domain Operations (MDO) until a Heavy Future Vertical Lift (FVL) variant is fielded. The Block II program will restore performance lost due to the added weight of safety and survivability equipment incorporated since initial fielding in 2007. Additional objectives of the Block II program include: efficiently incorporating multiple engineering changes, accomplishing required mid-life airframe recapitalization, converging the special operations and conventional Army designs, establishing a foundation for future block upgrades, and maintaining the industrial base until a Heavy FVL is realized.

Quantity of RDT&E Articles:

FY 2018 - Awarded: 1 - Ground Test Vehicle (GTV), 2 - CH-47F Block II Prototypes

FY 2019 - Awarded: 1 - CH-47F Block II Prototype

FY 2019 - Scheduled Delivery: 1 - GTV, 2 - CH-47F Block II Prototypes

FY 2020 - Scheduled Delivery: 1 - CH-47F Block II Prototype

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0607137A / Chinook Product Improvement Program				ES4 / Chinook Product Improvement Program							
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
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		6.651		-		-		-	0.000	6.651	-
<b>Subtotal</b>			-	-		6.651		-		-		-	0.000	6.651	N/A
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
Engineering and Manufacturing Development (EMD)	SS/CPIF	Boeing Ridley : Park, PA	127.179	89.739	Dec 2018	112.485	Dec 2019	20.763	Dec 2020	-		20.763	Continuing	Continuing	Continuing
Advanced Chinook Rotor Blade (ACRB)	SS/CPFF	Boeing Ridley : Park PA	49.217	9.858	Dec 2018	8.619	Nov 2019	13.300	Dec 2020	-		13.300	Continuing	Continuing	Continuing
Improved Drive Train (IDT)	SS/CPFF	Boeing Ridley : Park, PA	36.004	9.471	Dec 2018	7.587	Nov 2019	-		-		-	0.000	53.062	-
Transportable Flight Proficient Simulator (TFPS)	MIPR	NAVAIR : Patuxent River NAS, MD	9.915	12.300	May 2019	1.000	May 2020	-		-		-	Continuing	Continuing	-
FY 2019 NDAA SEC 825 MDAP Cost Overrun	Allot	To Be Determined : To Be Determined	-	0.020		-		-		-		-	0.000	0.020	-
Congressional Add Program Increase Expandable Rotorcraft Diagnostics	TBD	To Be Determined : To Be Determined	-	-		3.300		-		-		-	0.000	3.300	-
Congressional Add Program Increase Block II Lightweight Improvements	TBD	To Be Determined : To Be Determined	-	-		6.500		-		-		-	0.000	6.500	-
<b>Subtotal</b>			222.315	121.388		139.491		34.063		-		34.063	Continuing	Continuing	N/A

**UNCLASSIFIED**

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0607137A / Chinook Product Improvement Program				ES4 / Chinook Product Improvement Program							
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
Matrix and Contractor Support from External Sources	Various	Various Government and contractor : RSA & Huntsville, AL, Aberdeen Proving Ground MD,	15.284	7.163	Oct 2018	6.738	Oct 2019	3.811	Oct 2020	-		3.811	Continuing	Continuing	Continuing
<b>Subtotal</b>			15.284	7.163		6.738		3.811		-		3.811	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 and Evaluation	Various	Boeing Ridley : Park PA and Various Government	21.587	10.452	Dec 2018	18.591	Dec 2019	8.217	Dec 2020	-		8.217	Continuing	Continuing	Continuing
<b>Subtotal</b>			21.587	10.452		18.591		8.217		-		8.217	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			259.186	139.003		171.471		46.091		-		46.091	Continuing	Continuing	N/A
<b>Remarks</b>															



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date: February 2020</b>		
<b>Appropriation/Budget Activity</b> 2040 / 7		<b>R-1 Program Element (Number/Name)</b> PE 0607137A / Chinook Product Improvement Program		<b>Project (Number/Name)</b> ES4 / Chinook Product Improvement Program	

Event Name	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						
Improved Drive Train (IDT)	[Redacted]																																	
Transportable Flight Proficiency Simulator (TFPS)	[Redacted]																																	
CH-47F Block II EMD	[Redacted]																																	
Matrix and Contractor Support	[Redacted]																																	
Testing and Evaluation	[Redacted]																																	
Advanced Chinook Rotor Blade (ACRB)	[Redacted]																																	
Milestone C	[Redacted]																1																	

1  
CH-47F Block II

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607137A / <i>Chinook Product Improvement Program</i>	<b>Project (Number/Name)</b> ES4 / <i>Chinook Product Improvement Program</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Improved Drive Train (IDT)	3	2014	4	2022
Transportable Flight Proficiency Simulator (TFPS)	2	2018	4	2020
Milestone B	3	2017	3	2017
CH-47F Block II EMD	4	2017	4	2021
Matrix and Contractor Support	1	2017	4	2025
Testing and Evaluation	3	2015	4	2025
Advanced Chinook Rotor Blade (ACRB)	1	2011	1	2023
Milestone C	4	2021	4	2021

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0607138A / Fixed Wing Product Improvement Program
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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	-	2.146	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.146
ES5: Fixed Wing Product Improvement Program	-	2.146	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.146

**Note**

Fiscal Year (FY) 2021 funding request has decreased to \$0.

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

The budget line provides for Fixed Wing (FW) fielded fleet Non-Recurring Engineering (NRE), development of supplemental type certificates (STC) and associated developmental testing, and integration of all Army Fixed Wing Aircraft to provide Communications, Navigation and Surveillance (CNS), Aircraft Survivability Equipment (ASE), modifications in service, and Department of Defense (DoD) mandated safety equipment to meet current and evolving international and Army standards. As requirements for new avionics equipment evolve, aircraft delays and airspace exclusions are likely for aircraft not properly equipped. Upgrade of communication and aircraft modifications assures worldwide deployability for those required to deploy. This budget line provides funding for studies, evaluations and Analysis of Alternatives to support emerging Army Fixed Wing requirements for product improvements to support the FW fleet. This budget line also provides funding for continued Test and Evaluation of Fixed Wing Aircraft.

**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	2.280	4.545	1.920	-	1.920
Current President's Budget	2.146	0.000	0.000	-	0.000
Total Adjustments	-0.134	-4.545	-1.920	-	-1.920
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-4.545			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.134	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-1.920	-	-1.920

**Change Summary Explanation**

FY 2021 funding request has decreased to \$0.

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7				<b>R-1 Program Element (Number/Name)</b> PE 0607138A / Fixed Wing Product Improvement Program				<b>Project (Number/Name)</b> ES5 / Fixed Wing Product Improvement Program				
<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>
ES5: Fixed Wing Product Improvement Program	-	2.146	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.146
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Fiscal Year (FY) 2021 funding request has decreased to \$0.

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

The budget line provides for Fixed Wing (FW) fielded fleet Non-Recurring Engineering (NRE), development of supplemental type certificates (STC) and associated developmental testing, and integration of all Army Fixed Wing Aircraft to provide Communications, Navigation and Surveillance (CNS), Aircraft Survivability Equipment (ASE), modifications in service, and Department of Defense (DoD) mandated safety equipment to meet current and evolving international and Army standards. As requirements for new avionics equipment evolve, aircraft delays and airspace exclusions are likely for aircraft not properly equipped. Upgrade of communication and aircraft modifications assures worldwide deployability for those required to deploy. This budget line provides funding for studies, evaluations and Analysis of Alternatives to support emerging Army fixed wing requirements for product improvements to support the FW fleet. This budget line also provides funding for continued Test and Evaluation of Fixed Wing Aircraft.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Program Management (PM)	0.215	-	-
<b>Description:</b> Program Management support for Fixed Wing (FW) Aircraft efforts			
<b>Title:</b> Test And Evaluation	1.115	-	-
<b>Description:</b> Support studies, test and evaluations, and Analysis of Alternatives to support emerging Army FW requirements for product improvements to support the FW fleet.			
<b>Title:</b> Support Cost	0.816	-	-
<b>Description:</b> Non-recurring Engineering Support for FW Aircraft			
<b>Accomplishments/Planned Programs Subtotals</b>	2.146	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607138A / Fixed Wing Product Improvement Program	<b>Project (Number/Name)</b> ES5 / Fixed Wing Product Improvement Program

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

Line Item	FY 2019	FY 2020	FY 2021			FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• A11300: Utility F/W Aircraft	18.644	-	0.000	-	0.000	-	-	-	-	0.000	18.644
• AA0270: Utility/ Cargo Airplane Mods	17.719	21.838	13.868	-	13.868	-	-	-	-	Continuing	Continuing

**Remarks**

The A11300 Utility F/W Aircraft (Aircraft Procurement Army (APA) P-1 Line #1) budget line provides for the acquisition of Army Fixed Wing Aircraft in support of mission requirements, training, and other support activities. The AA0270 Utility/Cargo Airplane Mods (Aircraft Procurement Army (APA) P-1 Line #24) provides for aircraft modification in support of Fixed Wing programs.

**D. Acquisition Strategy**

The US Army Fixed Wing acquisition and modernization strategy leverages commercial derivative aircraft through the use of supplemental type certificates (STC) and associated testing and includes cockpit modernization for civil and tactical upgrades of military unique equipment and integration of Communications, Navigation and Surveillance (CNS) and Aircraft Survivability Equipment (ASE).

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607138A / Fixed Wing Product Improvement Program	<b>Project (Number/Name)</b> ES5 / Fixed Wing Product Improvement Program
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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 Support	Various	PM Fixed Wing : Redstone Arsenal, AL	0.585	0.215	Jan 2019	-		-		-		-	0.190	0.990	-
<b>Subtotal</b>			0.585	0.215		-		-		-		-	0.190	0.990	N/A

**Remarks**  
FY 2021 funding request has decreased to \$0.

<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			
Fixed Wing Non-recurring Engineering	Various	Various : Various	1.806	1.115	Mar 2019	-		-		-		-	0.866	3.787	-
<b>Subtotal</b>			1.806	1.115		-		-		-		-	0.866	3.787	N/A

**Remarks**  
FY 2021 funding request has decreased to \$0.

<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			
Testing Support	Various	Various : Various	8.080	0.816	Jun 2019	-		-		-		-	0.864	9.760	-
<b>Subtotal</b>			8.080	0.816		-		-		-		-	0.864	9.760	N/A

**Remarks**  
FY 2021 funding request has decreased to \$0.

	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>		10.471	2.146	0.000	-	-	-	1.920	14.537	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Army							<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 2040 / 7			<b>R-1 Program Element (Number/Name)</b> PE 0607138A / Fixed Wing Product Improvement Program			<b>Project (Number/Name)</b> ES5 / Fixed Wing Product Improvement Program				
	<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-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607138A / Fixed Wing Product Improvement Program	<b>Project (Number/Name)</b> ES5 / Fixed Wing Product Improvement Program	

Event Name	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
FW Non-Recurring Engineering	[Redacted]																											
Testing Support	[Redacted]																											

**Note**  
 FY19 Funds: \$2.146 million    FY20 Funds: \$0 million    FY21 Funds: \$0 million



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607138A / <i>Fixed Wing Product Improvement Program</i>	<b>Project (Number/Name)</b> ES5 / <i>Fixed Wing Product Improvement Program</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
FW Non-Recurring Engineering	1	2019	4	2019
Testing Support	1	2018	4	2019

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>					<b>R-1 Program Element (Number/Name)</b> PE 0607139A / <i>Improved Turbine Engine Program</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	-	173.766	206.434	249.257	-	249.257	245.566	205.906	182.831	130.887	0.000	1,394.647
ES6: <i>Improved Turbine Engine Program</i>	-	173.766	206.434	249.257	-	249.257	245.566	205.906	182.831	130.887	0.000	1,394.647

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

Improved Turbine Engine Program (ITEP) develops, tests, qualifies, and integrates the next generation turboshaft engine on Future Attack Reconnaissance Aircraft (FARA), Black Hawk and Apache aircraft. The Improved Turbine Engine (ITE) replaces the existing T700 engine design originated in the 1970's and meets the operational requirement of 6,000 feet pressure altitude and 95 degrees (6K/95). The ITE will fit inside the existing engine bays of the Black Hawk and Apache Helicopters and provides a significant power enhancement of up to fifty percent (total of 3,000 class shaft horsepower) with increased fuel efficiency. Additional benefits include improved design life, enhanced reliability, lower maintenance cost and restored capability lost due to aircraft weight growth without an increase to the logistics footprint. The program consists of systems engineering and program management, detailed design engineering, design assurance, hardware manufacturing and testing, component and module level development and testing, system level testing and qualification, and platform integration and qualification. ITEP is postured to accelerate based on General Electric contract incentives and integration.

Fiscal Year (FY) 2019 funds the Engineering and Manufacturing Development (EMD) contract that was awarded to General Electric in February 2019, platform/engine integration design engineering, and ballistic assessments ending in FY 2020. FY 2020 funding continues both the EMD effort and platform/engine integration A-kit development, engine Critical Design Review (CDR), engine component testing will begin, engine fit check will be performed for Apache and Black Hawk platforms, and the CDR for Apache. FY 2021 continues the EMD effort, continues engine component testing, leading to First Engine To Test (FETT), begins Preliminary Flight Rating (PFR) testing, completes the Black Hawk A-Kit CDR, and begins physical airframe integration. FY 2022 funding will continue PFR testing, leading to a Preliminary Flight Rated engine in FY 2023, and continues physical airframe integration. FY 2023 funding provides for aircraft flight/qualification testing for both Apache and Black Hawk and the initiation of engine full qualification testing. FY 2024 funding provides for completion of engine qualification, continuation of aircraft flight/qualification testing for both Apache and Black Hawk, and Low Rate Initial Production (LRIP). FY 2025 funding provides for engine integration and A-kit development for the H-60V platform, Initial Operational Test and Evaluation (IOTE) for Black Hawk and Apache, continuation of LRIP, and continuation of flight/qualification for both Black Hawk and Apache.

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607139A / <i>Improved Turbine Engine Program</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	188.903	206.434	279.600	-	279.600
Current President's Budget	173.766	206.434	249.257	-	249.257
Total Adjustments	-15.137	0.000	-30.343	-	-30.343
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-15.137	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-30.343	-	-30.343

**Change Summary Explanation**

For FY 2014 and prior, all funding for the Improved Turbine Engine Program (ITEP) was contained in Program Element (PE) 0203744A - Aircraft Modifications/Product Improvement Programs, Project 504. FY 2015 funding was initially moved to PE 0203744A, Project EB1. Prior to execution, FY 2015 and beyond funding was moved to PE 0607139A, Project ES6.

FY 2021 budget adjustment of \$30.100M from the President's Budget 2019 submission was based on the Department's mission priorities during the budget build.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607139A / Improved Turbine Engine Program				<b>Project (Number/Name)</b> ES6 / Improved Turbine Engine Program			
<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>
ES6: Improved Turbine Engine Program	-	173.766	206.434	249.257	-	249.257	245.566	205.906	182.831	130.887	0.000	1,394.647
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Improved Turbine Engine Program (ITEP) develops, tests, qualifies, and integrates the next generation turboshaft engine on Future Attack Reconnaissance Aircraft (FARA), Black Hawk and Apache aircraft. The Improved Turbine Engine (ITE) replaces the existing T700 engine design originated in the 1970's and meets the operational requirement of 6,000 feet pressure altitude and 95 degrees (6K/95). The ITE will fit inside the existing engine bays of the Black Hawk and Apache Helicopters and provides a significant power enhancement of up to fifty percent (total of 3,000 class shaft horsepower) with increased fuel efficiency. Additional benefits include improved design life, enhanced reliability, lower maintenance cost and restored capability lost due to aircraft weight growth without an increase to the logistics footprint. The program consists of systems engineering and program management, detailed design engineering, design assurance, hardware manufacturing and testing, component and module level development and testing, system level testing and qualification, and platform integration and qualification. ITEP is postured to accelerate based on General Electric contract incentives and integration.

Fiscal Year (FY) 2019 funds the Engineering and Manufacturing Development (EMD) contract that was awarded to General Electric in February 2019, platform/engine integration design engineering, and ballistic assessments ending in FY 2020. FY 2020 funding continues both the EMD effort and platform/engine integration A-kit development, engine Critical Design Review (CDR), engine component testing will begin, engine fit check will be performed for Apache and Black Hawk platforms, and the CDR for Apache. FY 2021 continues the EMD effort, continues engine component testing, leading to First Engine To Test (FETT), begins Preliminary Flight Rating (PFR) testing, completes the Black Hawk A-Kit CDR, and begins physical airframe integration. FY 2022 funding will continue PFR testing, leading to a Preliminary Flight Rated engine in FY 2023, and continues physical airframe integration. FY 2023 funding provides for aircraft flight/qualification testing for both Apache and Black Hawk and the initiation of engine full qualification testing. FY 2024 funding provides for completion of engine qualification, continuation of aircraft flight/qualification testing for both Apache and Black Hawk, and Low Rate Initial Production (LRIP). FY 2025 funding provides for engine integration and A-kit development for the H-60V platform, Initial Operational Test and Evaluation (IOTE) for Black Hawk and Apache, continuation of LRIP, and continuation of flight/qualification for both Black Hawk and Apache.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> ITEP	173.766	197.059	249.257
<b>Description:</b> ITEP - a multi-platform turbine engine development required across existing Army aircraft to fill the capability gaps for Army Aviation Operations			
<b>FY 2020 Plans:</b> Continuation of the EMD engine development effort culminating in a CDR. Continued platform/engine integration and A-kit design/development resulting in two A-kit Preliminary Design Reviews (PDRs) - one for Apache and one for Black Hawk.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607139A / Improved Turbine Engine Program	<b>Project (Number/Name)</b> ES6 / Improved Turbine Engine Program

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Completion of ballistic assessment, begin engine component testing, and perform engine fit check for both platforms. Life cycle support planning, and completion of the Analysis of Product Support Alternatives.</p> <p><b>FY 2021 Plans:</b> FY 2021 continues the EMD effort, continues engine component testing, leading to FETT, begins PFR testing, completes the Black Hawk A-Kit CDR, and begins physical airframe integration.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase is due to the start of PFR engine testing and A-kit manufacturing and testing.</p>			
<p><b>Title:</b> FY 2020 SBIR/STTR Transfer</p> <p><b>Description:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638</p>	-	9.375	-
<b>Accomplishments/Planned Programs Subtotals</b>	173.766	206.434	249.257

<p><b>C. Other Program Funding Summary (\$ in Millions)</b> N/A</p> <p><b>Remarks</b> For FY 2014 and prior, all funding for ITEP was contained in Program Element (PE) 0203744A - Aircraft Modifications/Product Improvement Programs, Project 504. FY 2015 funding was initially moved to PE 0203744A, Project EB1. Prior to execution, FY 2015 and beyond funding was moved to to PE 0607139A, Project ES6.</p> <p><b>D. Acquisition Strategy</b> Following a successful Milestone B decision, a cost-plus-incentive-fee contract was awarded to General Electric for EMD contractual effort.</p> <p>ITEP Platform Integration Trade Studies Contracts were awarded to the Boeing Company and the Sikorsky Corporation in FY 2015. In FY 2019, two follow-on efforts were awarded to design and develop A-kits to integrate the ITE into both the Apache and Black Hawk platforms. Following a successful Apache CDR in FY 2020 and Black Hawk CDR in FY2021, the integration efforts will continue to include fabrication of the A-kits, flight test support, and pubs/provisioning.</p>
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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>											<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 2040 / 7						<b>R-1 Program Element (Number/Name)</b> PE 0607139A / Improved Turbine Engine Program					<b>Project (Number/Name)</b> ES6 / Improved Turbine Engine Program				

<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</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 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</b>	<b>Award Date</b>	<b>Cost</b>
ITEP SEPM - Organic	Allot	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	25.708	10.299	Oct 2018	9.063	Oct 2019	10.998	Oct 2020	-		10.998		Continuing	Continuing	Continuing
ITEP SEPM - Contractor	C/IDIQ	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	9.668	4.664	Oct 2018	3.425	Oct 2019	4.883	Oct 2020	-		4.883		Continuing	Continuing	Continuing
ITEP SEPM - OGA	MIPR	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	15.015	3.465	Oct 2018	2.161	Oct 2019	3.588	Oct 2020	-		3.588		Continuing	Continuing	Continuing
ITEP EMD SSEB	MIPR	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	5.708	-		-		-		-		-		0.000	5.708	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		9.375		-		-		-		0.000	9.375	-
<b>Subtotal</b>			56.099	18.428		24.024		19.469		-		19.469		Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0607139A / Improved Turbine Engine Program				Project (Number/Name) ES6 / Improved Turbine Engine 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
ITEP Technology Maturation/Risk Reduction (TMRR) Contracts	C/FPIF	General Electric Company (GE), and Advanced Turbine Engine Company (ATEC) : Lynn, MA (GE), and Phoenix, AZ (ATEC)	259.970	-		-		-		-		-	0.000	259.970	-
Engine OEM EMD Contract	C/CPIF	General Electric Company (GE) : Lynn, MA	-	121.900	Feb 2019	136.178	Oct 2019	129.726	Oct 2020	-		129.726	Continuing	Continuing	Continuing
Boeing - ITEP Vehicle Platform Integration Trade Studies Contract	SS/IDIQ	The Boeing Company : Phoenix, AZ	15.200	-		-		-		-		-	0.000	15.200	-
Sikorsky Aircraft - ITEP Vehicle Platform Integration Trade Studies Contract	SS/FPIF	The Sikorsky Corporation : Stratford, CT	26.328	-		-		-		-		-	0.000	26.328	-
Platform Integration and Qualification Contracts	SS/CPIF	The Boeing Company, The Sikorsky Corporation : Phoenix, AZ, Stratford, CT	-	22.529	Aug 2019	35.449	Oct 2019	77.605	Oct 2020	-		77.605	Continuing	Continuing	Continuing
<b>Subtotal</b>			301.498	144.429		171.627		207.331		-		207.331	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
ITEP Engineering Support - Organic	Allot	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE),	0.483	0.174	Oct 2018	0.178	Oct 2019	0.182	Oct 2020	-		0.182	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0607139A / Improved Turbine Engine Program				ES6 / Improved Turbine Engine Program							
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
		Various : Redstone Arsenal, AL													
ITEP Engineering Support - Contractor	C/IDIQ	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	4.923	3.561	Oct 2018	2.296	Oct 2019	3.729	Oct 2020	-		3.729	Continuing	Continuing	Continuing
ITEP Engineering Support - OGA	MIPR	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	14.632	7.046	Oct 2018	7.959	Oct 2019	11.867	Oct 2020	-		11.867	Continuing	Continuing	Continuing
Platform Integration Support	MIPR	Program Management Office (PMO) Apache and Black Hawk Project Offices : Redstone Arsenal, AL	-	-		-		6.079	Oct 2020	-		6.079	Continuing	Continuing	Continuing
<b>Subtotal</b>			20.038	10.781		10.433		21.857		-		21.857	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
Government Test Planning/Test Setup and Analysis	SS/TBD	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	-	0.128	Mar 2019	0.350	Oct 2019	0.600	Oct 2020	-		0.600	Continuing	Continuing	Continuing





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607139A / Improved Turbine Engine Program	<b>Project (Number/Name)</b> ES6 / Improved Turbine Engine Program

Event Name	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	
ITEP Systems Engineering/Program Management	[Redacted]																												
Milestone B	▲ 1																												
Milestone C																								▲ 6					
Development Engineering (TMRR)	[Redacted]																												
Air Vehicle Integration Trade Studies	[Redacted]																												
Engineering & Manufacturing Development					[Redacted]																								
EMD Contract Award	▲ 2																												
Critical Design Review (CDR)					▲ 3																								
Air Vehicle Integration					[Redacted]																								
Testing					[Redacted]																								
First Engine To Test (FETT)									▲ 4																				
Preliminary Flight Rating													▲ 5																
Low Rate Initial Production (LRIP)																					[Redacted]								

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607139A / <i>Improved Turbine Engine Program</i>	<b>Project (Number/Name)</b> ES6 / <i>Improved Turbine Engine Program</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ITEP Systems Engineering/Program Management	1	2015	1	2026
Milestone B	2	2019	2	2019
Milestone C	4	2024	4	2024
Development Engineering (TMRR)	4	2016	2	2019
Air Vehicle Integration Trade Studies	1	2015	2	2019
Engineering & Manufacturing Development	2	2019	1	2025
EMD Contract Award	2	2019	2	2019
Critical Design Review (CDR)	2	2020	2	2020
Air Vehicle Integration	2	2019	4	2026
Testing	2	2019	1	2026
First Engine To Test (FETT)	4	2021	4	2021
Preliminary Flight Rating	1	2023	1	2023
Low Rate Initial Production (LRIP)	4	2024	4	2026

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and 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>
Total Program Element	-	35.211	1.927	17.155	-	17.155	13.596	11.055	2.997	0.000	Continuing	Continuing
EW9: Aviation Rocket System Product Improvement and Dev	-	35.211	1.927	17.155	-	17.155	13.596	11.055	2.997	0.000	Continuing	Continuing

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

The Aviation Rockets and Small Guided Munitions Product Improvement and Development line funds the development, integration and test of current and future munitions and launchers, and their interface to platforms. Additionally, it will fund a range of improvement initiatives to modernize the Hydra-70 2.75 Inch rocket and launcher system. The current Hydra-70 2.75 inch rocket system requires performance improvements to comply with 1) US Code - Title 10, Chapter 141, Section 2389 "Ensuring Safety regarding Insensitive Munitions", 2) Department of Defense (DoD) Directive 5000.1, Chairman of the Joint Chiefs of Staff (CJCS) Instruction 3170.01C, Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD (AT&L)) Memorandum of January 26, 1999, "Exemption for Existing Inventory Items to Insensitive Munitions (IM) Requirements", 3) validated Lightweight Precision Munition (LPM) Operational Needs Statement (ONS) 16-21556 and 15 Dec 2017 Directed Requirement, 4) signed Initial Capability Document (ICD) for Army Aviation Weapons, Sub systems and Munitions (AAWSSM), 5) Air Launched Effects (ALE) Initial Capability Refinement Document (ICRD) dated 21 October 2019, and 6) existing/emerging Headquarters, Department of the Army (HQDA) G-3/5/7 and U.S. Army Training and Doctrine Command (TRADOC) aviation weapon requirements for guided and unguided rocket systems. Improvements to existing rocket systems and munitions will include design, qualification and integration of precision guidance capability, increased lethality, improved target suppression, increased standoff range, reduced minimum engagement range, improved pre-launch constraints and munitions communications/programmability, increased stowed kills, increased product reliability, improved hardness against unplanned stimuli, reduced war fighter workload, and reduced environmental impact for both manned and unmanned applications.

**B. Program Change Summary (\$ 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>
Previous President's Budget	38.452	24.221	17.171	-	17.171
Current President's Budget	35.211	1.927	17.155	-	17.155
Total Adjustments	-3.241	-22.294	-0.016	-	-0.016
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-22.294			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-3.241	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.016	-	-0.016

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development				<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev			
<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>
EW9: Aviation Rocket System Product Improvement and Dev	-	35.211	1.927	17.155	-	17.155	13.596	11.055	2.997	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Aviation Rockets and Small Guided Munitions Product Improvement and Development line funds the development, integration and test of current and future munitions and launchers, and their interface to platforms. Additionally, it will fund a range of improvement initiatives to modernize the Hydra-70 2.75 Inch rocket and launcher system. The current Hydra-70 2.75 inch rocket system requires performance improvements to comply with 1) US Code - Title 10, Chapter 141, Section 2389 "Ensuring Safety regarding Insensitive Munitions", 2) Department of Defense (DoD) Directive 5000.1, Chairman of the Joint Chiefs of Staff (CJCS) Instruction 3170.01C, Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD (AT&L)) Memorandum of January 26, 1999, "Exemption for Existing Inventory Items to Insensitive Munitions (IM) Requirements", 3) validated Lightweight Precision Munition (LPM) Operational Needs Statement (ONS) 16-21556 and 15 Dec 2017 Directed Requirement, 4) signed Initial Capability Document (ICD) for Army Aviation Weapons, Sub systems and Munitions (AAWSSM), 5) Air Launched Effects (ALE) Initial Capability Refinement Document (ICRD) dated 21 October 2019, and 6) existing/emerging Headquarters, Department of the Army (HQDA) G-3/5/7 and U.S. Army Training and Doctrine Command (TRADOC) aviation weapon requirements for guided and unguided rocket systems. Improvements to existing rocket systems and munitions will include design, qualification and integration of precision guidance capability, increased lethality, improved target suppression, increased standoff range, reduced minimum engagement range, improved pre-launch constraints and munitions communications/programmability, increased stowed kills, increased product reliability, improved hardness against unplanned stimuli, reduced war fighter workload, and reduced environmental impact for both manned and unmanned applications.

**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> Guided Air-to-Ground Rockets (AGR) variants (Advanced Precision Kill Weapon System (APKWS))	0.906	0.499	0.748	-	0.748
<b>Description:</b> These funds will be used to optimize current and future AGR variant integration on the Apache and for activities required to obtain an Army Full Materiel Release (FMR). This effort will include design and build of all-up-round (AUR) containers and test assets, conduct environmental qualification testing, perform ground firings, update aviation platform software, support Apache weapon survey firings, provide technical support to platform integration and testing, and development and revision of training/maintenance materiel.					
<b>FY 2020 Plans:</b> Continued efforts to optimize fire control integration on the AH-64 Apache for guided variants.					
<b>FY 2021 Base Plans:</b> 1. Complete efforts to optimize fire control integration on the AH-64 Apache for rotary wing guided variants.					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development	<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev			
<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>
2. Begin efforts to optimize fire control integration for single software variant guided rockets. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease due to completion of Air-to-Ground Rockets integration and qualification activities.					
<b>Title:</b> Modernized Rocket Launcher Increment 1 <b>Description:</b> This effort provides the interface with aircraft and emerging munitions utilizing non-proprietary, open systems architecture allowing easy compatibility when integrating with aircrafts. This inherent flexibility of an open architecture serves as a building block for future weapons systems and is the basis for an Integrated Munitions Launcher (IML). This effort evaluates launcher-to-munition electrical and mechanical interfaces for a fully capable smart munition and launcher system for the legacy fleet, as well as reduces both programmatic and technical risk. The effort informs requirements for a government owned, non-proprietary physical interface definition.	9.519	-	-	-	-
<b>Title:</b> Smart Digital Interface <b>Description:</b> The Smart Digital Interface program is an effort to support both the LPM Directed Requirement and the future smart, two-way digital communications capability to be included in the fully capable IML. This effort will evaluate launcher-to-munition physical interface technologies for the fully capable smart munition and launcher system to reduce both programmatic and technical risk, as well as to inform requirements for a government owned, nonproprietary physical interface definition.	6.264	-	-	-	-
<b>Title:</b> Army Aviation Weapons <b>Description:</b> These funds will be used for Army Aviation modular weapon systems and their interface to launchers and platforms. These efforts will include technical assessments, concept studies, perform risk reduction efforts, technology maturation, demonstration, engineering design, engineering / manufacturing development, test, integration and document preparation for Army Aviation manned and unmanned platforms. Evaluation of the Smart Digital Interface technologies will be leveraged to facilitate satisfaction of Lightweight Precision Munition (LPM) ONS and Directed Requirement. The LPM efforts will be utilized to identify deficiencies and define future requirements to include the AAWSSM Capability Development Document. <b>FY 2020 Plans:</b> 1. Continued technical assessments, concept studies, performed risk reduction efforts and prepared appropriate documentation for emerging AAWSM. Initial Capability Document requirements.	18.522	1.428	0.762	-	0.762

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development	<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev

<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>2. Continued Lighweight Precision Munitions technology maturity and risk reduction efforts with industry to include fabrication of munition/launch system prototypes, evaluated mature existing systems to meet validated ONS 16-21556 and 15 Dec 2017 Directed Requirement, integration and test efforts on the MQ-1C Gray Eagle.</p> <p><b>FY 2021 Base Plans:</b></p> <p>1. Continue technical assessments, concept studies, perform risk reduction efforts and prepare appropriate documentation for AAWSM Initial Capability Document and subordinately derived requirements.</p> <p>2. Perform analysis to support emerging efforts such as extended range propulsion technology, sensors, and inertial guidance</p> <p>.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease due to completion of preliminary tasks, awaiting additional munition requirements.</p>					
<p><b>Title:</b> Integrated Munitions Launcher (IML)</p> <p><b>Description:</b> These funds will be used to design, develop, and qualify a future launcher with standard interfaces to support current and future munitions outlined in the AAWSM ICD, dated 17 July 2018 and the Air Launched Effects (ALE) Initial Capability Refinement Document (ICRD) dated 21 Oct 2019. This effort allows the government to align technology enabling solutions with the AAWSSM ICD, maturing technological developments of IML prototypes at the subsystem level to mitigate Apache helicopter and Gray Eagle Unmanned Aerial System launcher obsolescence limitations.</p> <p>The IML effort will define and provide the interface between aircraft and emerging munitions utilizing a non-proprietary, open systems architecture allowing easy compatibility when integrating on to aviation platforms. The inherent flexibility of an open architecture serves as a building block for future weapons systems. This effort includes the design of a launcher with future smart, two-way digital communications capability and the capability to launch current and future weapons from aviation aircraft.</p> <p><b>FY 2021 Base Plans:</b> Continue IML architecture design and structure concept development. Design and build IML prototypes at the subsystem level. Perform safety testing to address release retention force methodology and the coupling to launch transient events.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>	-	-	15.645	-	15.645

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development	<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev

<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>
Decrease due to completion of preliminary tasks.					
<b>Accomplishments/Planned Programs Subtotals</b>	35.211	1.927	17.155	-	17.155

<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>
• E37300: Rocket, Hydra 70, All Types	275.685	250.453	125.915	33.880	159.795	88.507	147.482	100.696	78.649	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**  
 The Acquisition Strategy is to utilize in-house expertise, Other Government Agencies, defense industry capabilities, and when appropriate utilize Other Transactional Agreement. The strategy allows the Government the ability to support urgent operational needs and unanticipated incidents, which require immediate and expert attention. This strategy will allow for the Government to maintain the Hydra-70 all-up-round rocket, its variants, Small Guided Munitions and posture for emerging requirements while leveraging new authorities and bringing along as many technologies as funding allows.



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development	<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev
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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			
System Engineering/ Project Management	SS/ Various	Various : Performers	0.225	8.131	Oct 2018	0.489	Oct 2019	0.859	Oct 2020	-		0.859	Continuing	Continuing	-
<b>Subtotal</b>			0.225	8.131		0.489		0.859		-		0.859	Continuing	Continuing	N/A

<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 Precision Kill Weapon System (APKWS)	MIPR	CCDC : Redstone Arsenal, AL	0.482	0.906	Nov 2018	0.254	Nov 2019	0.710	Nov 2020	-		0.710	0.000	2.352	-
Modernized Rocket Launcher Increment 1	MIPR	CCDC : Redstone Arsenal, AL	1.164	5.877	Nov 2018	-		-		-		-	0.000	7.041	-
Smart Digital Interface	MIPR	CCDC : Redstone Arsenal, AL	7.791	6.264	Jan 2019	-		-		-		-	0.000	14.055	-
Army aviation weapons	MIPR	Various : Various Performers	-	11.839	Nov 2018	1.184	Jan 2020	0.724	Jan 2021	-		0.724	Continuing	Continuing	-
Integrated Munitions Launcher	MIPR	CCDC : Redstone Arsenal, AL	-	-		-		14.862	Dec 2020	-		14.862	Continuing	Continuing	-
<b>Subtotal</b>			9.437	24.886		1.438		16.296		-		16.296	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			
Research Studies	MIPR	CCDC : Redstone Arsenal, AL	-	2.076	Dec 2018	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	2.076		-		-		-		-	Continuing	Continuing	N/A

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development	<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev
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Test and Evaluation (\$ 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			
Developmental Testing	C/Various	TBD : TBD	-	0.118	Dec 2018	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.118		-		-		-		-	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			9.662	35.211		1.927		17.155		-		17.155	Continuing	Continuing	N/A

**Remarks**  
The decrease in Fiscal Year (FY) 2021 is due to completion of activities associated with the validated ONS 16-21556 and Directed Requirement for Lightweight Precision Munitions.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date: February 2020</b>		
<b>Appropriation/Budget Activity</b> 2040 / 7		<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development		<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev	

Event Name	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
APKWS	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
Modernized Rocket Launcher Increment 1	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
Smart Digital Interface	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
Integrated Munitions Launcher	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
Army aviation weapons	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
LPM Operational Assessment	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
LPM Flight Test	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development	<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
APKWS	3	2018	2	2021
Modernized Rocket Launcher Increment 1	3	2018	4	2019
Smart Digital Interface	3	2018	4	2019
Integrated Munitions Launcher	1	2020	1	2022
Army aviation weapons	2	2019	4	2028
LPM Operational Assessment	4	2019	2	2021
LPM Flight Test	2	2021	2	2021

**Note**  
 APKWS: Advanced Precision Kill Weapon System  
 AAWSSM ICD: Army Aviation Weapons, Sub-systems and Munitions Initial Capability Document  
 LPM: Lightweight Precision Munition

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					<b>R-1 Program Element (Number/Name)</b> PE 0607143A / Unmanned Aircraft System Universal Products							
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	-	36.488	18.132	7.743	-	7.743	4.897	0.500	0.500	0.500	Continuing	Continuing
EX1: Unmanned Aircraft Systems Universal Products	-	36.488	18.132	7.743	-	7.743	4.897	0.500	0.500	0.500	Continuing	Continuing

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

Scalable Control Interface (SCI) will be the primary means of Command and Control (C2) for Program of Record Army Unmanned Aircraft Systems (UAS). SCI software will be hosted on Mission Command devices in both ground and airborne platforms serving as nodes on the Integrated Tactical Network to retrieve and provide data. SCI distributes UAS capabilities by greatly increasing the number of UAS control devices available to Soldiers and Commanders through the depth of the battlefield. SCI provides simultaneous control of multiple aircraft from a single node. SCI leverages a Modular Operating System Approach (MOSA) to software in order to reduce time and cost to integrate new hardware and software in response to the dynamic future operating environment.

Deployment of SCI will include, but is not limited to, devices in the Mobile/Handheld Computing Environment (such as Nett Warrior), Mounted Computing Environment (such as MFoCS), and Command Post Computing Environment (such as TSI). SCI will integrate decision-aiding, autonomy, and artificial intelligence as they mature technically, in order to support MDO tenets and enable Many-to-Many (vice 1 controller: 1 UAS) Control/use of UAS assets and reduce cognitive workload.

Justification: FY2021 SCI (Formerly Universal Product) Base funding of \$7.743M will be used to continue the development of software applications needed to address the SCI MOSA/Future Airborne Capabilities Environment (FACE) Compliant Software requirement that support NETT Warrior, Mounted Family of Computer Systems (MFoCS), and Mission Command Tactical Server Infrastructure (TSI). Pertinent activities include Systems Engineering, Software Integration, Logistics Planning, Test, and Program Management.

<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	38.331	32.016	7.751	-	7.751
Current President's Budget	36.488	18.132	7.743	-	7.743
Total Adjustments	-1.843	-13.884	-0.008	-	-0.008
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-13.884			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.843	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.008	-	-0.008

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607143A / <i>Unmanned Aircraft System Universal Products</i>				<b>Project (Number/Name)</b> EX1 / <i>Unmanned Aircraft Systems Universal Products</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>
EX1: <i>Unmanned Aircraft Systems Universal Products</i>	-	36.488	18.132	7.743	-	7.743	4.897	0.500	0.500	0.500	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Scalable Control Interface (SCI) will be the primary means of Command and Control (C2) for Program of Record Army Unmanned Aircraft Systems (UAS). SCI software will be hosted on Mission Command devices in both ground and airborne platforms serving as nodes on the Integrated Tactical Network to retrieve and provide data. SCI distributes UAS capabilities by greatly increasing the number of UAS control devices available to Soldiers and Commanders through the depth of the battlefield. SCI provides simultaneous control of multiple aircraft from a single node. SCI leverages a Modular Operating System Approach (MOSA) to software in order to reduce time and cost to integrate new hardware and software in response to the dynamic future operating environment.

Deployment of SCI will include, but is not limited to, devices in the Mobile/Handheld Computing Environment (such as Nett Warrior), Mounted Computing Environment (such as MFoCS), and Command Post Computing Environment (such as TSI). SCI will integrate decision-aiding, autonomy, and artificial intelligence as they mature technically, in order to support MDO tenets and enable Many-to-Many Control/use of UAS assets and reduce cognitive workload.

Justification: Fiscal Year (FY) 2021 SCI (Formerly Universal Product) Base funding of \$7.743 million will be used to continue the development of software applications needed to address the SCI MOSA/Future Airborne Capabilities Environment (FACE) Compliant Software requirement that support NETT Warrior, Mounted Family of Computer Systems (MFoCS), and Mission Command Tactical Server Infrastructure (TSI).

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Universal Products Improvements/Scalable Control Interface	10.523	-	-
<b>Description:</b> Development of Universal Products Improvements - Funding continues to support development of Hardware, Software, and documentation to ensure a supportable Universal Ground Control Station (UGCS), Missile Defense Activation Rehearsal and Training (MDAR-T), and Universal Ground Data Terminal (UGDT) that increases interoperability and commonality. This software will also support emerging UAS UGCS.			
<b>Title:</b> Scalable Control Interface (SCI)	25.965	18.132	7.743
<b>Description:</b> SCI will be the primary means of C2 for Program of Record Army UAS. SCI software will be hosted on Mission Command devices in both ground and airborne platforms serving as nodes on the Integrated Tactical Network to retrieve and provide data. SCI distributes UAS capabilities by greatly increasing the number of UAS control devices available to Soldiers and Commanders through the depth of the battlefield. SCI provides simultaneous control of multiple aircraft from a single node			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607143A / <i>Unmanned Aircraft System Universal Products</i>	<b>Project (Number/Name)</b> EX1 / <i>Unmanned Aircraft Systems Universal Products</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> Base Funding of \$18.132 million used to continue the development of software applications needed to address the SCI MOSA/FACE compliant Software requirement that support NETT Warrior, MFOCS, and Mission Command TSI.</p> <p><b><i>FY 2021 Plans:</i></b> Base Funding of \$7.743 million will be used to continue the development of software applications needed to address the SCI MOSA/FACE compliant Software requirement that support NETT Warrior, MFOCS, and Mission Command TSI.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> The development of SCI MOSA software will continue in 2020. Decreased funding in 2020 will add risk to continued development and integration of FACE and UCS aligned software in support of the SCI MOSA requirement and lower risk in meeting FY 2025 expected fielding.</p>			
<b>Accomplishments/Planned Programs Subtotals</b>	36.488	18.132	7.743

**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>
• A02706: <i>Universal Ground Control Equipment (UAS)</i>	27.114	2.090	7.509	-	7.509	7.611	-	-	-	0.000	44.324

**Remarks**

**D. Acquisition Strategy**

SCI Software development and integration efforts are based on competitive awards. Acquisition of a standard Government owned software and architecture will prevent duplication of the time and cost as new UAS Platforms along with current will utilize the standard control software. Product Offices Designing, Developing, Delivering and Sustaining unique requirements will have control software readily available.

SCI focused on primarily Gov't-Owned technical solutions that postures the Gov't to take advantage of industry competition and avoid costly Sole Source arrangements.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>												<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 2040 / 7						<b>R-1 Program Element (Number/Name)</b> PE 0607143A / Unmanned Aircraft System Universal Products						<b>Project (Number/Name)</b> EX1 / Unmanned Aircraft Systems Universal Products			

<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>	<b>Cost To Complete</b>			
Universal Products (UGCS) Improvements	C/CPFF	TBD : TBD	6.601	10.523		-		-		-		-	0.000	17.124	-	
Training Device Improvements	C/CPFF	TBD : TBD	3.917	-		-		-		-		-	0.000	3.917	-	
Scalable Control Interface (SCI) Software Development	TBD	TBD : TBD	26.408	25.965	Mar 2020	18.132	Mar 2020	7.743	Jan 2021	-		7.743	0.000	78.248	-	
<b>Subtotal</b>			36.926	36.488		18.132		7.743		-		7.743	0.000	99.289	N/A	
<b>Project Cost Totals</b>			36.926	36.488		18.132		7.743		-		7.743	0.000	99.289	N/A	

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607143A / <i>Unmanned Aircraft System Universal Products</i>	<b>Project (Number/Name)</b> EX1 / <i>Unmanned Aircraft Systems Universal Products</i>

Event Name	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
DMEA Phase 2	[Redacted]				[Redacted]																							
	Software Infrastructure Phase 2																											
Kutta Software Infrastructure Prototyping	[Redacted]				[Redacted]																							
					Infrastructure Prototyping and Infrastructure Investigation																							
Software Integrator					[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
					Software Integrator																							
SCI Reference Architecture Demo					▲ 1 SCI RA Demo																							
SCI Command and Control Demo									▲ 2 SCI C2 Demo																			
SCI Air-Launched-Effects Demo													▲ 3 SCI ALE Demo															
SCI Demo																	▲ 4 SCI Demo											
SCI Integration and Test																					[Redacted]							
																					SCI Integration and Test							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607143A / <i>Unmanned Aircraft System Universal Products</i>	<b>Project (Number/Name)</b> EX1 / <i>Unmanned Aircraft Systems Universal Products</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
DMEA Phase 1	1	2017	4	2018
DMEA Phase 2	2	2019	2	2020
Kutta Software Infrastructure Prototyping	3	2019	2	2020
Software Integrator	2	2020	2	2024
SCI Reference Architecture Demo	2	2020	2	2020
SCI Command and Control Demo	2	2021	2	2021
SCI Air-Launched-Effects Demo	2	2022	2	2022
SCI Demo	2	2023	2	2023
SCI Integration and Test	2	2024	3	2025

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>					<b>R-1 Program Element (Number/Name)</b> PE 0607145A / <i>Apache Future 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	-	0.000	5.448	77.177	-	77.177	9.024	11.595	10.485	0.000	0.000	113.729
FD5: <i>Apache Product Improvement</i>	-	0.000	5.448	77.177	-	77.177	9.024	11.595	10.485	0.000	0.000	113.729

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

The Apache Capabilities Enhancements (ACE) prioritizes, informs, influences, matures, tracks, statuses, and packages technologies and/or material solutions to address known capability gaps, identified during real-world combat missions and associated with current/emerging threats; for transition to Apache development for integration and implementation to the AH-64E fleet to increase combat capability.

<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	5.448	7.252	-	7.252
Current President's Budget	0.000	5.448	77.177	-	77.177
Total Adjustments	0.000	0.000	69.925	-	69.925
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	69.925	-	69.925

**Change Summary Explanation**

Additional funding for Spike Non Line Of Sight (NLOS) missile system.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607145A / Apache Future Development				<b>Project (Number/Name)</b> FD5 / Apache Product Improvement			
<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>
FD5: Apache Product Improvement	-	0.000	5.448	77.177	-	77.177	9.024	11.595	10.485	0.000	0.000	113.729
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Apache Capabilities Enhancements (ACE) prioritizes, informs, influences, matures, tracks, statuses, and packages technologies and/or material solutions to address known capability gaps, identified during real-world combat missions and associated with current/emerging threats; for transition to Apache development for integration and implementation to the AH-64E fleet to increase combat capability.

**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> Product Development	-	5.448	7.252	-	7.252
<b>Description:</b> Future development of production program.					
<b>FY 2020 Plans:</b> Performed trade studies evaluating options for pursuing a family, i.e. large, medium, small, of common processors that are software and unit-level re-configurable and exploring options for sensor processing and fusion at the platform level processor or other dedicated processor. The common processor trade study supported Apache's approach for addressing the increasing demand for processing power while reducing logistical impact from both a maintenance and supply perspective. The sensor processing and fusion at a platform level processor or other upstream dedicated processor trade study looked at identifying upstream processing options for providing an optimized situational awareness picture of the operational environment and supporting enhanced target/threat identification utilizing multiple sensor inputs.					
<b>FY 2021 Base Plans:</b> Apache Program management Office (PMO) needs to develop a phased approach to incorporate an Improved Tail Rotor Drive System (ITRDS) for the AH-64 platform. Several improvements to the existing drivetrain are necessary to increase safety margins on the tail rotor anti-torque capability. The platform overtime will continue to increase in gross weight through system upgrades and larger payloads being authorized. Missions being conducted at higher density altitudes and an increased gross weight will put the warfighters at risk of being in a loss of tail rotor authority scenario which can lead to a catastrophic situation. These product improvements would increase performance from the legacy design, decrease the maintenance burden on the warfighter, and reduce overall O&S costs. These improvements would also build the infrastructure for an improved Drive system					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607145A / Apache Future Development	<b>Project (Number/Name)</b> FD5 / Apache Product Improvement

<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>
that will be able to handle increased performance upgrades, provide a positive impact to future sustainment, support Multi-Domain Operations, and ensuring the warfighter is not placed in a catastrophic situation when it is preventable. The funding would be utilized to conduct analysis, determine feasibility of life limits, and initiate redesign plans on new components of the drive system to include hanger bearings, elastomeric mounts, Intermediate Gearbox (IGB), Tail Rotor Gearbox (TRGB), drive shafts, and other components impacted on the Tail Rotor Drive System found during testing.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase in funding request for Project FD5 Apache Product Improvement from FY 2020 to FY 2021.					
<b>Title:</b> Spike NLOS (Non Line Of Sight)  <b>FY 2021 Base Plans:</b> Apache will Federate the Spike NLOS (Non Line Of Sight) missile system by providing Program Management, Systems Engineering, Development Test, Live Fire Test, Life Cycle Management and Integrated Logistics. This effort will support the AH-64D/E of an interim Long Range Precision Munition (LRPM) solution. The Army will optimize the Aviation munitions portfolio as part of this strategy creating reinvestment opportunities to close existing lethality gaps by making the portfolio sufficiently lethal for both manned and unmanned platforms against a broad range of increasingly more sophisticated threats.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase in funding request for Project FD5 Apache Product Improvement from FY 2020 to FY 2021 to support Spike NLOS Directed Requirement.	-	-	69.925	-	69.925
<b>Accomplishments/Planned Programs Subtotals</b>	-	5.448	77.177	-	77.177

<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>
• A05111: AH-64 Apache Block IIIA Reman	927.798	1,010.100	961.487	-	961.487	705.535	678.822	805.508	571.077	6,118.130	11,778.457
• A05133: AH-64 Apache Block IIIB New Build	510.414	-	0.000	69.154	69.154	-	-	-	-	-	Continuing
• AA6605: AH-64 MODS	104.996	58.172	118.316	-	118.316	84.420	82.084	64.619	4.954	-	Continuing

**Remarks**

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607145A / Apache Future Development	Project (Number/Name) FD5 / Apache Product Improvement

**D. Acquisition Strategy**

The NRE will encompass subsystem integration and will utilize existing test aircraft, incorporate the technical insertions, and initiate appropriate qualification and operational flight-testing. In FY 2014, a contract for Apache AH-64E Lot 3, initiating Full Rate Production, was awarded with options for Lot 4. Training device concurrency will be maintained with each technical insertion. The Engineering/Manufacturing Design (EMD) effort is managed as Cost Reimbursable. Production efforts will be awarded as Fixed Price Incentive (FPI) and include the Advance Procurement requirements. In FY 2013, FY 2014, and FY 2015 MRL NRE encompassed US Government (USG) design of the Hydra Launcher Electronics Assembly (LEA), modification of the M261 launcher, launcher fabrication, and launcher testing. In FY 2015 - FY 2019, Apache AH-64E Version 6 System Development and Demonstration (SDD) Contract. Multi-year production awarded March 15, 2017. FY 2020 - FY 2023, the Apache Capabilities Enhancements (ACE) delivers required capability enhancements supported by Apache's Modernization Strategy to ensure AH-64E maintains relevance and dominance throughout its expected service life.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607145A / Apache Future Development	<b>Project (Number/Name)</b> FD5 / Apache Product Improvement	

Event Name	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
Contract Award																												
Contract Award for SPIKE NLOS																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607145A / <i>Apache Future Development</i>	<b>Project (Number/Name)</b> FD5 / <i>Apache Product Improvement</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Contract Award	1	2020	3	2021
Contract Award for SPIKE NLOS	1	2021	4	2022

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607150A / <i>Intel Cyber 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	-	0.000	0.000	14.652	-	14.652	14.592	14.920	15.380	15.881	0.000	75.425
BS5: <i>Intel Cyber Development</i>	-	0.000	0.000	14.652	-	14.652	14.592	14.920	15.380	15.881	0.000	75.425

**Note**

This Program Element (PE) is a Restructure from PE 0303028A Security and Intelligence Activities in FY 2021.

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

The U.S. Army Intelligence and Security Command's (INSCOM) RDTE program provides the Army with low-density, high-demand, extremely advanced offensive cyberspace technologies designed to degrade, deny, disrupt, or destroy adversary Command, Control, Communications, Computers and Intelligence (C4I) and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.

INSCOM conducts RDTE of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, National Security Presidential Directive (NSPD)-38, NSPD-54 and Homeland Security Presidential Directive (HSPD)-23.

HQDA G-2 and the Intelligence and Security Command (INSCOM) Security Operations Center (ISOC) are charged with integrating, informing, and leveraging security and counterintelligence authorities in support of the Department of the Army Insider Threat Program mission to continuously deter, detect, and mitigate insider threats to Army information, networks, facilities, and personnel.

<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
Current President's Budget	0.000	0.000	14.652	-	14.652
Total Adjustments	0.000	0.000	14.652	-	14.652
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	14.652	-	14.652

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607150A / <i>Intel Cyber Development</i>	
<b><u>Change Summary Explanation</u></b> This Program Element (PE) is a Restructure from PE 0303028A Security and Intelligence Activities in FY 2021.		

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607150A / Intel Cyber Development				<b>Project (Number/Name)</b> BS5 / Intel Cyber 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>
BS5: Intel Cyber Development	-	0.000	0.000	14.652	-	14.652	14.592	14.920	15.380	15.881	0.000	75.425
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In FY 2021, this Project is realigned from Program Element (PE) 0303028A Security and Intelligence Activities.

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

The U.S. Army Intelligence and Security Command's (INSCOM) RDTE program provides the Army with low-density, high-demand, extremely advanced offensive cyberspace technologies designed to degrade, deny, disrupt, or destroy adversary Command, Control, Communications, Computers and Intelligence (C4I) and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.

INSCOM conducts RDTE of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, National Security Presidential Directive (NSPD)-38, NSPD-54 and Homeland Security Presidential Directive (HSPD)-23.

HQDA G-2 and the Intelligence and Security Command (INSCOM) Security Operations Center (ISOC) are charged with integrating, informing, and leveraging security and counterintelligence authorities in support of the Department of the Army Insider Threat Program mission to continuously deter, detect, and mitigate insider threats to Army information, networks, facilities, and personnel.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Offensive Cyberspace Operations Capability Development	-	-	14.652
<b>Description:</b> INSCOM's RDTE program provides the Army with low-density, high-demand, extremely advanced offensive cyberspace technologies designed to degrade, deny, disrupt, or destroy adversary C4I and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.			
<b>FY 2021 Plans:</b> Develop and support leading-edge Cyberspace technologies designed to exploit, degrade, deny, disrupt, or destroy threat command, control, communications, computers and intelligence (C4I) cyber systems to enable commanders in shaping the operational warfighting environment in order to create conditions favorable to the application of other elements of national power. Support the development of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607150A / Intel Cyber Development	<b>Project (Number/Name)</b> BS5 / Intel Cyber Development
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
Guidance, Defense Cyber Strategy, Presidential Policy Directive (PPD) 20, National Security Presidential Directive (NSPD) 54, Homeland Defense Presidential Directive (HSPD) 23, and The Army Operating Concept.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> This Program Element (PE) is a Restructure from PE 0303028A Security and Intelligence Activities in FY 2021.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	14.652

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607150A / Intel Cyber Development	<b>Project (Number/Name)</b> BS5 / Intel Cyber Development
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Event Name	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
Offensive Cyberspace Operations Capability Development																												
Offensive Cyberspace Operations Capability Development																												

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607150A / <i>Intel Cyber Development</i>	<b>Project (Number/Name)</b> BS5 / <i>Intel Cyber Development</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Offensive Cyberspace Operations Capability Development	1	2021	2	2028



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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>					<b>R-1 Program Element (Number/Name)</b> PE 0607312A / <i>Army Operational Systems Development</i>							
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	45.026	35.851	-	35.851	33.858	33.032	33.554	33.893	0.000	215.214
BR5: <i>Army Operational Systems Development</i>	-	0.000	45.026	35.851	-	35.851	33.858	33.032	33.554	33.893	0.000	215.214

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

The Army Operational System Development budget line includes development efforts across all Army Battlefield Operating Systems to upgrade systems that have been fielded or have received approval for full rate production. Systems in this budget line are characterized as having, or supporting programs that have received, Milestone C or Low Rate Initial Production (LRIP) approval.

Selected programs within this budget line will exhibit a logical progression of program phases, development and production funding within the FYDP, consistent with the Department's full funding policy.

<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	49.526	35.885	-	35.885
Current President's Budget	0.000	45.026	35.851	-	35.851
Total Adjustments	0.000	-4.500	-0.034	-	-0.034
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-4.500			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.034	-	-0.034

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607665A / <i>Family of Biometrics</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	-	2.320	1.702	1.324	-	1.324	1.192	1.208	1.220	1.232	Continuing	Continuing
DT2: <i>Non-MIP Biometrics</i>	-	0.956	0.281	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.237
DU2: <i>Management Agency</i>	-	1.364	1.421	1.324	-	1.324	1.192	1.208	1.220	1.232	Continuing	Continuing

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

DT2 / Non-MIP Biometrics - Biometrics Enabling Capability 0 (BEC 0), aka DoD Automated Biometrics Identification System (DoD ABIS), is an Army information technology system supporting identity superiority by providing the critical core capability for Warfighters to identify known or suspected threat actors in Multi Domain Operations (MDO) to include peer adversaries, terrorists and third country nationals. BEC 0 is an Army Program of Record and DoD's only authoritative biometric repository, providing 24/7 operational support for the Warfighter and interagency partners to decide and act in near-real time with timely identification and identity verification of known or suspected threat actors across the full range of military operations. DoD ABIS enables actionable intelligence supporting offensive operations and preventing espionage, sabotage, terrorist operations and other coercive actions against US forces and partner nations. DoD ABIS enables the Army, all other DOD components, Interagency and International Partners to effectively impede adversary's ability to conceal their identity and intentions. DoD ABIS supports all three objectives of the National Defense Strategy to increase lethality, enhance International Cooperation, and improve business practices.

The Defense Forensics and Biometrics Agency (DFBA), under the Provost Marshal General, fulfills the Secretary of the Army's Executive Agent (EA) responsibilities for all DoD forensics and biometrics activities. In addition, DFBA is the proponent to establish and maintain Research, Development, Test & Evaluation (RDT&E) and information management support throughout the Armed Services and DoD. DFBA leads and facilitates in the development of improvement and implementation of efficiencies to developed and deployed biometric technologies for Combatant Commands (CCMDs), Services, DoD, and Agencies; facilitates transition of capabilities that contribute to the enhancement of the biometric community; increases Joint Service interoperability; and empowers the warfighter by improving operational effectiveness on the battlefield. The DFBA strategy pursues technology opportunities through scientific discovery and makes investments responsive to specific requirements identified by combat developers.

Justification:

FY 2021 RDT&E funding in DT2 is \$0. BEC 0 is in sustainment.

FY 2021 funding in the amount of \$1.325 million for Project DU2 will provide DFBA the ability to actively manage research efforts to ensure scientific merit, feasibility, and that DFBA objectives and requirements are met. DFBA supports the conduct of biometrics and forensics activities (e.g. standards conformance and interoperability assessments), support to DoD acquisition organizations, and provision of subject matter expertise to DoD and non-DoD government stakeholders.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607665A / <i>Family of Biometrics</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	2.397	1.702	1.325	-	1.325
Current President's Budget	2.320	1.702	1.324	-	1.324
Total Adjustments	-0.077	0.000	-0.001	-	-0.001
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.077	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.001	-	-0.001

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607665A / Family of Biometrics				<b>Project (Number/Name)</b> DT2 / Non-MIP Biometrics			
<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>
DT2: <i>Non-MIP Biometrics</i>	-	0.956	0.281	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.237
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

BEC Increment 0 is in sustainment.

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

DT2 / Non-MIP Biometrics - Biometrics Enabling Capability 0 (BEC 0), aka DoD Automated Biometrics Identification System (DoD ABIS), is an Army information technology system supporting identity superiority by providing the critical core capability for Warfighters to identify known or suspected threat actors in Multi Domain Operations to include peer adversaries, terrorists and third country nationals. BEC 0 is an Army Program of Record and DoD's only authoritative biometric repository, providing 24/7 operational support for the Warfighter and interagency partners to decide and act in near-real time with timely identification and identity verification of known or suspected threat actors across the full range of military operations. DoD ABIS enables actionable intelligence supporting offensive operations and preventing espionage, sabotage, terrorist operations and other coercive actions against US forces and partner nations. DoD ABIS enables the Army, all other DOD components, Interagency and International Partners to effectively impede adversary's ability to conceal their identity and intentions. DoD ABIS supports all three objectives of the National Defense Strategy to increase lethality, enhance International Cooperation, and improve business practices.

Justification:

FY 2021 RDT&E funding is \$0. BEC 0 is in sustainment.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> DoD ABIS (BEC 0)	0.956	0.268	-
<b>Description:</b> Funds supports the following effort			
<b>FY 2020 Plans:</b> FY 2020 RDT&E funding in the amount of \$0.281 million (DT2: Non MIP Biometrics) supports cyber security testing and preparation for operational testing of the SLEP.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease to \$0 FY 2021 BASE RDT&E for BEC O sustainment due to completion of BEC 0 service life extension.			
<b>Title:</b> FY 2020 SBIR/STTR Transfer	-	0.013	-
<b>Description:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>FY 2020 Plans:</b>			

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607665A / Family of Biometrics	<b>Project (Number/Name)</b> DT2 / Non-MIP Biometrics
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
Funding transferred in accordance with Title 15 USC ?638			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b>			
Funding transferred in accordance with Title 15 USC ?638			
<b>Accomplishments/Planned Programs Subtotals</b>	0.956	0.281	-

<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>
• BA1300: FAMILY OF BIOMETRICS	8.319	1.000	0.000	-	0.000	-	-	-	-	0.000	9.319

**Remarks**

**D. Acquisition Strategy**

The BEC Increment 0 program is in sustainment.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 7				PE 0607665A / Family of Biometrics				DT2 / Non-MIP Biometrics								
<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	
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.013		-		-		-	0.000	0.013	-	
<b>Subtotal</b>			-	-		0.013		-		-		-	0.000	0.013	N/A	
<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/CPFF	Various : various	87.351	-		-		-		-		-	0.000	87.351	-	
Service Life Extension	Option/ Various	Leidos : Fairmont, WV	18.603	0.956	May 2019	0.268		-		-		-	0.000	19.827	-	
<b>Subtotal</b>			105.954	0.956		0.268		-		-		-	0.000	107.178	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	
PM Civilian Personnel	TBD	Alexandria : Virginia	3.358	-		-		-		-		-	0.000	3.358	-	
Other Support Costs (Facility Related Expenses)	TBD	Alexandria : Virginia	0.794	-		-		-		-		-	0.000	0.794	-	
<b>Subtotal</b>			4.152	-		-		-		-		-	0.000	4.152	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 and Evaluation (System Testing)	MIPR	Army Test and Evaluation (ATEC); Joint Interoperability Test Command : Various Locations	3.282	-		-		-		-		-	0.000	3.282	-	



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607665A / Family of Biometrics	<b>Project (Number/Name)</b> DT2 / Non-MIP Biometrics
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Event Name	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
(1) BEC 0 DoD ABIS v1.2 Sustainment																												
(2) BEC 0 DoD ABIS SLEP Development and Contractor Testing																												
(3) BEC 0 DoD ABIS v1.3 Sustainment																												



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607665A / <i>Family of Biometrics</i>	<b>Project (Number/Name)</b> DT2 / <i>Non-MIP Biometrics</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
(1) BEC 0 DoD ABIS v1.2 Sustainment	1	2017	4	2020
Contract Award - 6 month Bridge (DoD ABIS v1.2) Sustainment	2	2017	2	2017
(2) BEC 0 DoD ABIS SLEP Development and Contractor Testing	3	2017	3	2020
Competitive Contract Award - SLEP (DoD ABIS v1.3)	3	2017	3	2017
(3) BEC 0 DoD ABIS v1.3 Sustainment	3	2020	4	2023

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607665A / Family of Biometrics				<b>Project (Number/Name)</b> DU2 / Management Agency			
<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>
DU2: Management Agency	-	1.364	1.421	1.324	-	1.324	1.192	1.208	1.220	1.232	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Defense Forensics and Biometrics Agency (DFBA), under the Provost Marshal General, fulfills the Secretary of the Army's Executive Agent (EA) responsibilities for all DoD forensics and biometrics activities. As the proponent, DFBA supports and provides oversight for Research, Development, Test & Evaluation (RDT&E) activities and information management throughout the Armed Services and DoD. DFBA leads and facilitates in the development of improvement and implementation of efficiencies to developed and deployed biometric technologies for Combatant Commands (CCMDs), Services, DoD, and Agencies; facilitates transition of capabilities that contribute to the enhancement of the biometric community; increases Joint Service interoperability; and empowers the warfighter by improving operational effectiveness on the battlefield. The DFBA strategy pursues technology opportunities through scientific discovery and makes investments responsive to specific requirements identified by combat developers.

**Justification:**

FY 2021 funding in the amount of \$1.325 million for Project DU2 will provide DFBA the ability to actively manage research efforts to ensure scientific merit, feasibility, and DFBA objectives and requirements are met. DFBA supports the conduct of biometric and forensics activities (e.g. standards conformance and interoperability assessments), support to DoD acquisition organizations, and provision of subject matter expertise to DoD and non-DoD government stakeholders.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Development and Implementation of Biometric Technologies	1.364	1.356	1.324
<b>Description:</b> Biometrics and Forensics Technologies Research			
<b>FY 2020 Plans:</b> FY 2020 funding in the amount of \$1.421 million will provide DFBA the ability to actively manage research efforts to ensure scientific merit, feasibility, and DFBA objectives and requirements are met. Funding will be used to support enhancements for automated matching and detection capabilities for fingerprints, palm, face, iris, voice, and DNA modalities supporting DoD acquisition organizations and stakeholders, and in coordination with non-DoD stakeholders.			
<b>FY 2021 Plans:</b> FY 2021 funding in the amount of \$1.325 million for Project DU2 will provide DFBA the ability to actively manage research efforts to ensure scientific merit, feasibility, and DFBA objectives and requirements are met. DFBA supports the conduct of biometric and forensics activities (e.g. standards conformance and interoperability assessments), support to DoD acquisition organizations, and provision of subject matter expertise to DoD and non-DoD government stakeholders.			
<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 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607665A / <i>Family of Biometrics</i>	<b>Project (Number/Name)</b> DU2 / <i>Management Agency</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
The decrease of \$0.096 million in FY 2021 BASE RDT&E is a result of planned program efficiencies.			
<b>Title:</b> FY 2020 SBIR/STTR Transfer	-	0.065	-
<b>Description:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>Accomplishments/Planned Programs Subtotals</b>	1.364	1.421	1.324

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

N/A

**Remarks**

**D. Acquisition Strategy**

DFBA uses a variety of existing contract vehicles to support the continued development of technology advancements for the fingerprint, face, iris, palm, DNA reference, and voice modalities. In addition to advancing the state of the art, these efforts enable DFBA to produce updated standards and architectures for the DoD Biometrics and Forensics Enterprise in support of interoperability objectives.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607665A / Family of Biometrics	<b>Project (Number/Name)</b> DU2 / Management Agency
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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			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.065		-		-		-	0.000	0.065	-
<b>Subtotal</b>			-	-		0.065		-		-		-	0.000	0.065	N/A

<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			
DFBA RDTE efforts	MIPR	Various Activities : Various locations	11.054	1.364	May 2019	1.356	Jun 2020	1.324	Jun 2021	-		1.324	Continuing	Continuing	-
<b>Subtotal</b>			11.054	1.364		1.356		1.324		-		1.324	Continuing	Continuing	N/A

**Remarks**  
Continuation of development of state of the art sensor capabilities enables the advancement of collection, match, share, and store capabilities. As sensors mature and take advantage of new spectra for biometric identification, the results from these capabilities enable DFBA to proactively advance the standards and architectures needed to use the advanced capabilities.

	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>	11.054	1.364	1.421	1.324	-	1.324	Continuing	Continuing	N/A

**Remarks**



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607665A / <i>Family of Biometrics</i>	<b>Project (Number/Name)</b> DU2 / <i>Management Agency</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
DFBA RDT&E Fingerprint, Face, Iris, Palm, and Voice	2	2019	4	2024
DFBA Interoperability	2	2019	4	2024

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>					<b>R-1 Program Element (Number/Name)</b> PE 0607865A / <i>Patriot Product Improvement</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	-	72.895	87.430	187.840	-	187.840	161.960	134.570	137.267	137.281	Continuing	Continuing
DV8: <i>Patriot Product Improvement</i>	-	72.895	87.430	187.840	-	187.840	161.960	134.570	137.267	137.281	Continuing	Continuing

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

The PATRIOT Product Improvement Program (PIP) provides for the upgrade of the PATRIOT System through individual materiel changes and upgrades to the PATRIOT system to address operational lessons learned, enhancements to joint force interoperability, and other system performance improvements to provide overmatch capability with the emerging threat. As software and hardware improvements are developed, there is a continuing need for system level modeling, simulation, integration and testing. Modeling and Simulation (M&S) allow for performance assessment against all threats that would not be possible in flight tests due to cost, target and range constraints. Flight testing is periodically required for validation of the modeling and simulation as well as satisfying Army Test and Evaluation Command/ Director, Operational Test and Evaluation (ATEC/DOTE) requirements of segment improvements.

This effort supports work with national agencies to evaluate, assess, and develop means to mitigate threat trends and specific threat developments potentially impacting system performance. Specific improvements may be developed and fielded under this task if warranted. The effort maintains the Mission Tailoring Database, responding to immediate tactical concerns. Database updates are fielded between major software upgrades as necessary.

The PIP line also supports identification, analysis, design, and test materiel solutions to counter cyber security and electronic warfare shortcomings to all elements of the Lower Tier Battle Space.

PATRIOT is an integral part of the overall Air and Missile Defense (AMD) Architecture and enables the incremental fielding of the system capability for Army Air and Missile Defense Battalions.

FY 2021 base dollars in the amount of \$187,840 million support the continuance of Software Improvement for Threat Evolution, PAC-3 Seeker Software Improvement, Advanced Electronic Counter Measures (AECM), Assured Positioning, Navigation and Timing (PNT), Combat ID enhancements, Tasks 2, 6, and 7 activities, program integration, modeling and simulation, acquisition of test assets and targets, Mobile Flight Mission Simulator (MFMS), PDB-8, ARM Asset Defense, government and contractor support.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0607865A / <i>Patriot Product Improvement</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	75.288	96.430	102.095	-	102.095
Current President's Budget	72.895	87.430	187.840	-	187.840
Total Adjustments	-2.393	-9.000	85.745	-	85.745
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-9.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.393	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	85.745	-	85.745

**Change Summary Explanation**

Increase to Program Element (PE) 0607865A Patriot Product Improvement is a result of FY 2021 funds realigned from PE 0205456A Lower Tier Air and Missile Defense (AMD) System Project EF9 System Integration and Test.



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607865A / <i>Patriot Product Improvement</i>				<b>Project (Number/Name)</b> DV8 / <i>Patriot Product Improvement</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>
DV8: <i>Patriot Product Improvement</i>	-	72.895	87.430	187.840	-	187.840	161.960	134.570	137.267	137.281	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The PATRIOT system includes a family of hardware, software, interceptors (PAC-2, Guidance Enhanced Missiles, PAC-3 and PAC-3 Missile Segment Enhancement) and Ground Support Equipment. As software and hardware improvements are developed, there is a continuing need for system level modeling, simulation, integration and testing. Modeling and simulation allow for performance assessment against all threats that would not be possible in flight tests due to cost, target, and range constraints. Flight testing is periodically required for validation of modeling and simulation as well as satisfying ATEC/DOTE requirements of segment improvements.

Software and hardware improvements for threat evolution: Performs necessary analysis and development efforts to maintain PATRIOT system effectiveness against evolving threat technologies and specific threat capabilities. This effort identifies evolving threats and threat characteristics that might present a challenge to PATRIOT's current capabilities and develops initial concepts to maintain system effectiveness relative to these threats.

Upper-Tier Debris Mitigation (UTDM): Implements algorithms to mitigate system impacts of debris from Upper Tier intercepts associated with operating in the Ballistic Missile Defense System (BMDS) environment. Debris from Upper Tier intercepts can cause significant radar loading effects and the potential for erroneous engagements and missile wastage on debris.

THAAD/PATRIOT Interoperability: Implements improvements to THAAD/PATRIOT Interoperability and addresses Joint Defense Network deficiencies that impact Tactical Ballistic Missile battle management and force/engagement operations. Efforts will be concentrated on joint, collaborative force operations (defense design and planning) and enhanced Tactical Digital Information Link - Joint interoperability.

Advanced Electronic Counter Measures (AECM): This task investigates the implications of advanced technology Digital Radio Frequency Memory available on airborne platforms that enables new ECM techniques which could adversely affect Air and Missile Defense System effectiveness.

Task 2: Implements improved ground system and interceptor capabilities (PATRIOT Advanced Capability-2/Guidance Enhanced Missiles, PATRIOT Advanced Capability-3, and Missile Segment Enhancement) to counter emerging Tactical Ballistic Missile threats.

Task 6: Software improvements enhance discrimination of higher altitude Tactical Ballistic Missile Re-entry Vehicles (RVs) from associated objects to support the full engagement capabilities of the interceptor. Longer-range detection, track, and improved high-altitude discrimination are required to achieve the required lethality performance against the RV and to mitigate missile wastage against separation debris. This task leverages the signal processing capabilities of the Radar Digital Processor, and supports the high altitude engagements required by the PATRIOT Advanced Capability-3 (PAC-3) and PAC-3 Missile Segment Enhancement (MSE) missiles.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607865A / <i>Patriot Product Improvement</i>	<b>Project (Number/Name)</b> DV8 / <i>Patriot Product Improvement</i>

Task 7: Performs analysis on existing and evolving Tactical Ballistic Missile countermeasures to determine the effects on PATRIOT system effectiveness. Develops hardware and software concepts to address countermeasure effects to ensure the PATRIOT system maintains its effectiveness. Develops detailed system requirements to implement concepts; design/code/test software implementation leveraging Radar Digital Processor, Modernized Adjunct Processor, Enhanced Weapons Control Computer - Emulator and Flight Solution Computer-Redesign processing capabilities. Implements simulation based concepts to define trade space and establish system requirements.

Assured Positioning, Navigation, and Timing (PNT): Efforts will develop and test the military's improved Global Position M-Code with PATRIOT Major End Items (MEI) integrating the improved anti-jamming and secure access of military GPS signals. This effort meets the requirement for Assured PNT through M-Code as mandated by Fiscal Year (FY) 2011 National Defense Act, public law 111-383 & 913.

Combat ID Enhancements: Develop and implement improvements to the Radar Digital Processor-Capability Combat ID capabilities and additional Non-Cooperative Target Recognition techniques to further mitigate misclassification and fratricide risk, and to provide the Warfighter with improved situational awareness.

Anti-Radiation Missile (ARM) Asset Defense: Provides improved capability for PATRIOT to protect other Army and Joint Services Sensors from ARM attacks. Builds on an initial capability provided in Post-Deployment Build-7 by determining remaining gaps, identifying and evaluating alternatives, and implementing further improvements.

Tactical Telemetry Ground Station: Develops a ground-based telemetry receive station to be deployed with the tactical units and collect PAC-3 telemetry data for tactical engagements. This data will be used to assess missile and system effectiveness in tactical environments against real-world threats, and will support the development of operational improvements (Firing Doctrine and other system settings) and system software improvements to mitigate stressing threat behaviors.

PAC-3 Seeker Software Improvements: Perform PAC-3 Missile Segment Software improvements to improve missile capability to counter Electronic Attack Threats.

US Government and contractor support for PIP efforts. Studies and support to ensure the system and its components continue to evolve to defeat threats.

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> PATRIOT Product Improvement	72.895	83.460	187.840
<b>Description:</b> Patriot Product improvement line provides continuous Improvement to keep pace with and counter evolving and emerging threats.			
<b>FY 2020 Plans:</b>			
-Continued Software Improvement for Threat Evolution and Advanced Electronic Countermeasures (AECM).			
-Continued Combat ID enhancements and Assured Positioning, Navigation, and Timing (PNT).			
-Continued Tasks 2, 6, and 7 activities.			
-U.S. Government and contractor support to counter emerging threat.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607865A / <i>Patriot Product Improvement</i>	<b>Project (Number/Name)</b> DV8 / <i>Patriot Product Improvement</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
-PAC-3 Seeker Software Improvements			
<b><i>FY 2021 Plans:</i></b> -Continue Software Improvement for Threat Evolution and AECM -Continue Combat ID enhancements, ARM Asset Defense, and Assured PNT -Continue Tasks 2, 6, and 7 activities -Continue program development through system level modeling, simulation, integration and test support -Continue test program to include utilization of targets/threat simulators, flight simulator and modeling efforts -Continue test activities to support the TEMP -Continue Ballistic Missile Defense System (BMDS) Integration Testing -Continue PATRIOT program M&S laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements -U.S. Government and contractor support to counter emerging threat -Continue PAC-3 Seeker Software Improvements			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> FY 2020 to FY 2021 funding increase reflect realignment of funds from PE 0205456A Lower Tier Air and Missile Defense (AMD) System Project EF9 System Integration and Test to support program integration and test activities related to the PATRIOT system.			
<b><i>Title:</i></b> FY 2020 SBIR/STTR Transfer <b><i>Description:</i></b> Funding transferred in accordance with Title 15 USC ?638  <b><i>FY 2020 Plans:</i></b> Funding transferred in accordance with Title 15 USC ?638 <b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Funding transferred in accordance with Title 15 USC ?638	-	3.970	-
<b>Accomplishments/Planned Programs Subtotals</b>	72.895	87.430	187.840

<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>
• C50700: <i>Patriot Mods</i>	323.228	278.716	278.050	-	278.050	223.174	232.559	168.392	178.539	Continuing	Continuing

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607865A / <i>Patriot Product Improvement</i>	<b>Project (Number/Name)</b> DV8 / <i>Patriot Product Improvement</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**  
The improvements/enhancements developed through the PATRIOT Product Improvement Program (PIP) are interrelated with the hardware kits that are procured and installed under the Missile Procurement, Army (MIPA) appropriation's PATRIOT Mods program and maximizes PAC-3 MSE capabilities.

**D. Acquisition Strategy**

The design objective of the PATRIOT system was to provide a baseline system capable of modification to cope with continuing threat evolution. This program minimizes technological risks and provides a means of enhancing system capability through planned upgrades of deployed systems. The PATRIOT Product Improvement Program upgrades the PATRIOT system to address operational lessons learned, enhancements to joint force interoperability and communications, and other system performance improvements to provide overmatch capability against the emerging threat. Upgrades are implemented through individual hardware and software materiel changes and fielded incrementally. This program encompasses several changes which will require the use of a variety of acquisition methods to develop, test, procure and field. Future hardware and software capabilities will be incorporated into future Post Deployment Build (PDB) releases. Developing, fabricating, and testing hit to kill surface to air missile and associated ground support equipment provides essential increases in battle space, accuracy, lethality and firepower to counter and destroy evolving air defense threats. These state-of-the-art capabilities and enhancements require ongoing demonstration through a series of flight tests and modeling and simulation activities.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607865A / Patriot Product Improvement	<b>Project (Number/Name)</b> DV8 / Patriot Product Improvement
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<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>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>	<b>Total Cost</b>	
Government Program Management	MIPR	RSA, AL : RSA, AL	8.890	2.538	Oct 2018	1.273	Oct 2019	5.444	Oct 2020	-		5.444	Continuing	Continuing	-
U.S. Contracts	Various	Multiple : Multiple	6.961	1.600	Feb 2019	1.239	Feb 2020	1.700	Feb 2021	-		1.700	Continuing	Continuing	-
PAC-3 Product Office	RO	Project Office : Huntsville, AL	-	-		-		1.900	Oct 2020	-		1.900	Continuing	Continuing	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		3.970		-		-		-	0.000	3.970	-
<b>Subtotal</b>			15.851	4.138		6.482		9.044		-		9.044	Continuing	Continuing	N/A

<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>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>	<b>Total Cost</b>	
Software Improvement for Threat Evolution	Various	Multiple : Multiple	46.269	9.018	Jan 2019	7.983	Jan 2020	8.756	Jan 2021	-		8.756	Continuing	Continuing	-
Advanced Electronic Counter Measures (AECM)	Various	Multiple : Multiple	65.162	18.576	Jan 2019	17.059	Jan 2020	22.390	Jan 2021	-		22.390	Continuing	Continuing	-
Task 2 Non-Ballistic Tactical Ballistic Missile (TBM)	Various	Multiple : Multiple	38.100	4.400	Feb 2019	5.839	Feb 2020	6.300	Feb 2021	-		6.300	Continuing	Continuing	-
Task 6 Discrimination Improvements	Various	Multiple : Multiple	37.500	3.700	Feb 2019	6.339	Feb 2020	6.100	Feb 2021	-		6.100	Continuing	Continuing	-
Task 7 TBM Countermeasures / Effectors	Various	Multiple : Multiple	27.700	10.000	May 2019	8.939	Feb 2020	9.561	Feb 2021	-		9.561	Continuing	Continuing	-
Assured PNT	Various	Multiple : Multiple	11.040	3.300	Jan 2019	2.439	Jan 2020	2.800	Jan 2021	-		2.800	Continuing	Continuing	-
Combat ID Enhancements	Various	Multiple : Multiple	23.120	11.537	May 2019	14.171	Feb 2020	14.736	Feb 2021	-		14.736	Continuing	Continuing	-
Anti-Radiation Missile (ARM) Asset Defense	Various	Raytheon : Andover, Massachusetts	5.000	-		-		2.000	May 2021	-		2.000	Continuing	Continuing	-
PAC-3 Seeker SW Improvement	TBD	Multiple : Multiple	-	7.526	Feb 2019	17.840	Feb 2020	13.874	Feb 2021	-		13.874	Continuing	Continuing	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607865A / Patriot Product Improvement	<b>Project (Number/Name)</b> DV8 / Patriot Product Improvement
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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			
CDC and OGAs	MIPR	RSA : RSA	-	-		-		0.800	Oct 2020	-		0.800	Continuing	Continuing	-
Program Integration MSE LMMFC	Various	LMMFC : Dallas, TX	-	-		-		21.262	Feb 2021	-		21.262	Continuing	Continuing	-
MSE/PAC-3 Raytheon	Various	Raytheon : Watham, Massachusetts	-	-		-		7.900	Feb 2021	-		7.900	Continuing	Continuing	-
SETA Contracts	Various	Multiple : Multiple	-	-		-		2.800	Feb 2021	-		2.800	Continuing	Continuing	-
<b>Subtotal</b>			253.891	68.057		80.609		119.279		-		119.279	Continuing	Continuing	N/A

**Remarks**  
The contract method type Sole Source/Various is Fixed Price Level of Effort which includes Cost Plus Fixed Fee for material, ODC, and travel.

<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			
CCDC and Other Govt Agencies	MIPR	RDEC and OGA'S : RSA, AL	5.212	0.700	Jan 2019	0.339	Jan 2020	6.800	Jan 2021	-		6.800	Continuing	Continuing	-
Targets/Threat Simulation	MIPR	Various : Huntsville, AL	-	-		-		26.396	Jan 2021	-		26.396	Continuing	Continuing	-
Modeling and Simulation	MIPR	Various : Huntsville, AL	-	-		-		3.600	Jan 2021	-		3.600	Continuing	Continuing	-
Contractor T&E	Various	Multiple : Various	-	-		-		8.906	Feb 2021	-		8.906	Continuing	Continuing	-
Other T&E	MIPR	Various : WSMR, NM	-	-		-		4.600	Jan 2021	-		4.600	Continuing	Continuing	-
Mobile Flight Mission Simulator	SS/FPIF	Raytheon : Massachusetts	-	-		-		1.000	Feb 2021	-		1.000	Continuing	Continuing	-
PDB-8	MIPR	Various : WSMR, NM	-	-		-		8.215	Feb 2021	-		8.215	Continuing	Continuing	-
<b>Subtotal</b>			5.212	0.700		0.339		59.517		-		59.517	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>		274.954	72.895	87.430	187.840	-	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Army							<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 2040 / 7			<b>R-1 Program Element (Number/Name)</b> PE 0607865A / <i>Patriot Product Improvement</i>			<b>Project (Number/Name)</b> DV8 / <i>Patriot Product Improvement</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-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607865A / <i>Patriot Product Improvement</i>	<b>Project (Number/Name)</b> DV8 / <i>Patriot Product Improvement</i>

Event Name	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
Software Build	[Redacted]																											
Advanced Electronic Counter Measures (AECM)	[Redacted]																											
Software Improvement for Threat Evolution	[Redacted]																											
Combat ID Enhancements	[Redacted]																											
PDB 8 Fielding	[Redacted]																											
PDB 8.1	[Redacted]																											
Task 2 Non-Ballistic Tactical Ballistic Missile (TBM)	[Redacted]																											
Task 6 Discrimination Improvements	[Redacted]																											
Task 7 TBM Countermeasures / Effectors	[Redacted]																											
Assured PNT	[Redacted]																											
PAC-3 Seeker Software Improvements	[Redacted]																											
PATRIOT System Testing, Integration and Evaluation	[Redacted]																											
Program Development, Integration, and Support	[Redacted]																											





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607865A / <i>Patriot Product Improvement</i>	<b>Project (Number/Name)</b> DV8 / <i>Patriot Product Improvement</i>

Event Name	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
Testing, Targets, Modeling and Simulation	[Redacted]																											
<i>Testing, Targets, Modeling and Simulation</i>	[Redacted]																											
PDB-8 Fielding	[Redacted]																											
<i>PDB-8 Fielding</i>	[Redacted]																											
Developmental/Operational Flight Testing	[Redacted]																											
<i>Developmental/Operational Flight Testing</i>	[Redacted]																											
Follow-On Flight Testing	[Redacted]																											
<i>Follow-On Flight Testing</i>	[Redacted]																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607865A / <i>Patriot Product Improvement</i>	<b>Project (Number/Name)</b> DV8 / <i>Patriot Product Improvement</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Software Build	4	2005	4	2027
Advanced Electronic Counter Measures (AECM)	1	2014	4	2027
Software Improvement for Threat Evolution	1	2014	4	2027
Combat ID Enhancements	1	2014	4	2027
PDB 8 Fielding	2	2018	4	2022
PDB 8.1	3	2022	3	2022
Task 2 Non-Ballistic Tactical Ballistic Missile (TBM)	1	2015	4	2027
Task 6 Discrimination Improvements	1	2014	4	2027
Task 7 TBM Countermeasures / Effectors	1	2015	4	2027
Assured PNT	1	2017	4	2021
PAC-3 Seeker Software Improvements	2	2020	4	2027
PATRIOT System Testing, Integration and Evaluation	1	2016	4	2027
Program Development, Integration, and Support	1	2016	4	2027
Testing, Targets, Modeling and Simulation	1	2016	4	2027
PDB-8 Fielding	2	2018	1	2028
Developmental/Operational Flight Testing	3	2020	4	2027
Follow-On Flight Testing	4	2022	4	2027

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCs)
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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	-	29.782	47.398	44.691	-	44.691	26.114	18.890	4.800	4.073	0.000	175.748
EF7: Precision Fires Warrior Dismounted & Mounted	-	3.493	3.500	3.320	-	3.320	3.312	3.307	3.305	2.692	0.000	22.929
EF8: AFATDS Increment 1	-	26.289	43.898	41.371	-	41.371	22.802	15.583	1.495	1.381	0.000	152.819

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

The Fire Support Command & Control (FSC2) funding line supports the Long Range Precision Fires (LRPF) Cross Functional Team (CFT), the #1 priority in the Army Modernization Strategy and the Common Operating Environment (COE). Efforts are aligned to support the Network-CFT capability set approach.

FSC2 supports the development of Advanced Field Artillery Tactical Data System (AFATDS), LRPF CFT, Extended Range Canon Artillery (ERCA), Extended Range Guided Multiple Launch Rocket System (ER-GMLRS), Precision Strike Missile System (PRSM) initiatives. In order to support these initiatives, AFATDS will serve as the key sensor to shooter link for the Army and USMC providing fully automated support for planning, coordinating, controlling and executing fires and effects. AFATDS also began supporting Long Range Hypersonic Weapons (LRHW) in FY 2020. Fire Support Command and Control (FSC2) systems automate the planning and execution of fire support operations so that a suitable weapon or group of weapons adequately cover targets. Fire support is the effect of lethal and non-lethal weapons (fires) that directly support land, maritime, amphibious and special operation forces to engage enemy forces, combat formations, and facilities in pursuit of tactical and operational objectives. FSC2 family consists of Advanced Field Artillery Tactical Data System (AFATDS), Joint Automated Deep Operations Coordination System (JADOCs), and Precision Fires Dismounted and Mounted (PF-D/M), formerly known as Pocket-sized Forward Entry Device (PFED).

The Advanced Field Artillery Tactical Data System (AFATDS) provides the Army, Navy, and Marine Corps automated fire support command, control and communications. AFATDS is used to plan, execute, and deliver lethal and non-lethal effects. AFATDS provides Joint/Coalition Situational Awareness for fires execution and mission management. The system interoperates and integrates with over 80 different battlefield systems, including Navy and Air Force command and control weapons systems. As a member of the Artillery System Cooperation Agreement (ASCA), AFATDS is interoperable with coalition partner fire support systems. AFATDS automates the planning, coordination, and control of all fire support assets (field artillery, mortars, close air support, naval gunfire, attack helicopters, offensive electronic warfare, fire support meteorological systems, forward observers, and fire support radars). AFATDS 7.0 modernizes the existing AFATDS software currently in the field. AFATDS 7.0 enhances the existing AFATDS baseline by: (1) Providing a modernized web service based backend that will simplify long-term maintenance of the software, (2) Bringing AFATDS into full compliance with the Army's COE, Command Post Computing Environment (CPCE) initiative, and (3) Enhancing overall usability of the system through the implementation of a role-based capability architecture with embedded training that allows the AFATDS operator to receive on-the-spot training for any aspect of AFATDS via interactive instruction.

Precision Fires Dismounted and Mounted (PF-D/M), is a software application that operates on the Nett Warrior End User Device (EUD). It will provide the dismounted Forward Observer (FO) and Fire Support Teams (FISTs) the capability and functionality to accurately and rapidly locate ground targets and digitally process a Call

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / <i>Joint Automated Deep Operation Coordination System (JADOCS)</i>
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for Fire. PF-D answers the Mobile Handheld Computing Environment requirement that all handheld applications reside on the Nett Warrior EUD. PF-M answers the mounted computing environment requirement and will reside on Mounted Family of Computer Systems (MFoCS) computers.

<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	30.915	47.398	34.289	-	34.289
Current President's Budget	29.782	47.398	44.691	-	44.691
Total Adjustments	-1.133	0.000	10.402	-	10.402
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.133	-			
• Adjustments to Budget Years	-	-	10.402	-	10.402

**Change Summary Explanation**

FY 2021 Base appropriation was increased by \$10.4 million to fund AFATDS 7.0 development for Common Operating Environment (COE) compliance.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)				<b>Project (Number/Name)</b> EF7 / Precision Fires Warrior Dismounted & Mounted			
<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>
EF7: Precision Fires Warrior Dismounted & Mounted	-	3.493	3.500	3.320	-	3.320	3.312	3.307	3.305	2.692	0.000	22.929
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

PF-D/M, formerly known as Pocket-sized Forward Entry Device (PFED) Increment II is a software application that operates on the Nett Warrior (NW) End User Device (EUD). It will provide the dismounted Forward Observer (FO) and Fire Support Teams (FISTs) the capability and functionality to accurately and rapidly locate ground targets and digitally process a Call For Fire. PF-D answers the Mobile Handheld Computing Environment requirement that all handheld applications reside on the NW EUD. PF-M answers the mounted computing environment requirement and will reside on Mounted Family of Computer Systems (MFoCS).

FY 2021 funding of \$3.320 million is to complete development, testing of Block 2 capabilities and continue hardware/software integration with NW EUD. Begin the development of Block 3 capabilities with MFoCS vehicle integration.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Program Management Support Costs for PF-D/M	0.390	0.438	0.411
<b>Description:</b> Program support for PF-D/M software development efforts.			
<b>FY 2020 Plans:</b> Will provide Program Management Office (PMO) support ( Matrix, and SETA) for all aspects of the PF-D/M program including requirements development, software development efforts, logistics, and business management support.			
<b>FY 2021 Plans:</b> Will provide Program Management Office (PMO) support ( Matrix, and SETA) for all aspects of the PF-D/M program including requirements development, software development efforts, logistics, and business management support.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease due to sharing of PMMC division assets for IA efforts.			
<b>Title:</b> PF-D/M Software Development	2.853	2.895	2.742
<b>Description:</b> PF-D/M Software Development			
<b>FY 2020 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)	<b>Project (Number/Name)</b> EF7 / Precision Fires Warrior Dismounted & Mounted

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Will continue development and testing of Block 2 capabilities. Complete hardware/software integration with Nett Warrior EUD and MFOCS. Complete software Information Assurance certification. <b>FY 2021 Plans:</b> Will complete development and testing of Block 2 capabilities. Complete HW and SW integrating with NW EUD. Begin the development of block 3 capabilities with vehicle integration onto MFOCS. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Software development costs reduced.			
<b>Title:</b> Testing for PF-D/M <b>Description:</b> Conduct and Support Army Testing Activities for PF-D/M <b>FY 2020 Plans:</b> Continue to prepare and execute Engineering Release Evaluation/Testing. <b>FY 2021 Plans:</b> DT/OT and AIC testing.	0.250	0.167	0.167
<b>Accomplishments/Planned Programs Subtotals</b>	3.493	3.500	3.320

**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>
• BZ9851: POCKET FORWARD ENTRY DEVICE (PFED)	10.644	8.620	3.896	-	3.896	2.897	2.098	2.198	2.297	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

On 18 May 2015, the Milestone Decision Authority (PEO C3T) signed the Acquisition Decision Memorandum (ADM) approving the PFED Increment II Milestone B. The ADM officially approved entry into the Development phase as an Acquisition Category (ACAT) III program. The system received a Limited Deployment Decision in Jan 2017, to enter into operational test and in Jan 2018 received Full Deployment Decision for Block 1 and Full Material Release.

PF-D/M leverages an Army Science and Technology investment by transitioning a software application that has been developed and used in proponent experimentation events (e.g. Army Expeditionary Warrior Experiment (AEWE) and Bold Quest). Upon a successful Milestone B decision in FY15, this software application transitioned to PM Mission Command (PMMC) to conduct all Army developmental and operational test and evaluation requirements. PF-D/M will be integrated onto the Nett Warrior

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / <i>Joint Automated Deep Operation Coordination System (JADOCS)</i>	<b>Project (Number/Name)</b> EF7 / <i>Precision Fires Warrior Dismounted &amp; Mounted</i>
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(NW) End User Devices (EUDs) and will be fielded by PM Soldier Warrior (PM SWAR). Training on the PF-D/M software will be conducted by PMMC as units are fielded the capability. PF-M will be developed on the MCE baseline and co-hosted on the Military Family of Computer Systems (MFoCS).

PF-D/M is developed using a block approach where capability is incrementally added to the overall baseline over the course of four blocks. PF-D/M Block 2 focuses on transitioning from a standalone Android application to a plugin on the ATAK architecture. Capabilities include Sensor Interoperability, Digital Precision Strike Suite, and Digitally Aided Close Air Support over the Link 16 network. PF-D/M Block 3 focuses on the transition to the mounted environment. This will move the PF-D Block 2 baseline onto the MFoCS, which is a complete replacement for the LFED/FOS and offers enhanced interoperability to Fire Support Sensors mounted on the platform and offer capabilities of interacting with Net-Enabled munitions. PF-D/M Block IV will be determined by the FCoE Governance Board under the IT Box policy.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)	<b>Project (Number/Name)</b> EF7 / Precision Fires Warrior Dismounted & Mounted
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<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>			
Program Management Support for PF-D/M (CORE)	Sub Allot	PM Mission Command (MC) : APG, MD	0.100	-		-		-		-		-	0.000	0.100	-
Program Management Support for PF-D/M (Matrix)	IA	Various Mix Orgs (Govt) : APG, MD	0.301	0.190		0.226		0.226		-		0.226	0.000	0.943	-
Program Management Support for PF-D/M (SETA)	C/FFP	CRSA : APG, MD	0.450	0.200		0.212		-		-		-	0.000	0.862	-
Program Management Support for PF-D/M (SETA)	C/FFP	CACI : APG, MD	-	-		-		0.185	Mar 2021	-		0.185	0.000	0.185	-
<b>Subtotal</b>			0.851	0.390		0.438		0.411		-		0.411	0.000	2.090	N/A

<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>			
PF-D/M Software Development efforts	IA	AMRDEC : Redstone, AL	10.448	2.853		2.895		-		-		-	Continuing	Continuing	Continuing
PF-D/M Software Development efforts	IA	DOTC : Piccatinny, NJ	-	-		-		2.742	Nov 2020	-		2.742	0.000	2.742	-
<b>Subtotal</b>			10.448	2.853		2.895		2.742		-		2.742	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 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>			
Program Management Support	Various	PM Mission Command (MC) : APG, MD	1.517	-		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			1.517	-		-		-		-		-	Continuing	Continuing	N/A





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)	<b>Project (Number/Name)</b> EF7 / Precision Fires Warrior Dismounted & Mounted

Event Name	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
Software Development Block 2																												
LDD Block 2									▲ 2																			
Software Development Block 3																												
OT&E Block 3																				■								
FDD Block 3																								▲ 6				
OT&E Block 2									■																			
FDD Block 2											▲ 3																	
IOC Block 2												▲ 4																
BD Block 3								▲ 1																				
LDD Block 3																				▲ 5								
IOC Block 3																												▲ 7

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)	<b>Project (Number/Name)</b> EF7 / Precision Fires Warrior Dismounted & Mounted

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone B	3	2015	3	2015
Initial Operational Capability (IOC) Block 1	3	2018	3	2018
Software Development Block 2	2	2018	2	2021
LDD Block 2	1	2021	1	2021
Software Development Block 3	2	2021	1	2025
OT&E Block 3	3	2023	4	2023
FDD Block 3	1	2024	1	2024
Limited Deployment Decision (LDD) Block 1	1	2016	1	2016
OT&E Block 1	1	2017	2	2017
Full Deployment Decision (FDD) Block 1	2	2018	2	2018
Build Decision (BD) Block 2	2	2018	2	2018
OT&E Block 2	1	2021	2	2021
FDD Block 2	1	2022	1	2022
IOC Block 2	2	2022	2	2022
BD Block 3	4	2020	4	2020
LDD Block 3	4	2023	4	2023
IOC Block 3	4	2024	4	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)					<b>Project (Number/Name)</b> EF8 / AFATDS Increment 1			
<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>	
EF8: AFATDS Increment 1	-	26.289	43.898	41.371	-	41.371	22.802	15.583	1.495	1.381	0.000	152.819	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

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

The Advanced Field Artillery Tactical Data System (AFATDS) funding line supports the Army Modernization Strategy Common Operating Environment. Efforts are aligned to support the Network-Cross Functional Team (CFT) capability set approach to achieve the network modernization strategy. AFATDS 7.0 modernizes the existing AFATDS software currently in the field. AFATDS 7.0 enhances the existing AFATDS baseline by: (1) Providing a modernized web service based backend that will simplify long-term maintenance of the software, (2) Bringing AFATDS into full compliance with the Army's Common Operating Environment (COE) Command Post Computing Environment (CPCE) initiative and (3) Enhancing overall usability of the system through the implementation of a role-based capability architecture with embedded training that allows the AFATDS operator to receive on-the-spot training for any aspect of AFATDS via interactive instruction.

FY 2021 funding of \$41.371 million will be used to facilitate development and continue to focus on the AFATDS v7.0 effort to include building fire support, fire control and fire direction role-based capabilities, integrating available CPCE common components, and updating the user interface for the Software.

AFATDS supports Long Range Precision Fires (LRPF) CFT, Extended Range Canon Artillery (ERCA), Extended Range Guided Multiple Launch Rocket System (ER-GMLRS), Precision Strike Missile System (PRSM) and emerging sensor to shooter initiatives. To support these initiatives, AFATDS will serve as the key sensor to shooter link for the Army and US Marine Corps providing fully automated support for planning, coordinating, controlling and executing fires and effects. AFATDS began supporting Long Range Hypersonic Weapons in FY 2020.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Program Management Costs for AFATDS software development	2.193	5.413	5.250
<b>Description:</b> Provide program support for AFATDS software development efforts.			
<b>FY 2020 Plans:</b> Continue to provide Program Management Office (PMO) support ( Matrix, and SETA) for all aspect of the AFATDS program including requirements analysis, software development efforts, logistics, and business management support.			
<b>FY 2021 Plans:</b> Continue to provide Program Management Office (PMO) support (Matrix, and SETA) for all aspect of the AFATDS program including requirements analysis, software development efforts, logistics, and business management support.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>			

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)	<b>Project (Number/Name)</b> EF8 / AFATDS Increment 1
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Reduction of manpower requirements.			
<b>Title:</b> AFATDS software development efforts <b>Description:</b> Development of AFATDS 7.0 software  <b>FY 2020 Plans:</b> Development will continue to focus on the AFATDS v7.0 effort to include building fire support, fire control and fire direction role based capabilities, integrating available CP CE v3 common components, and updating the user interface for the application. <b>FY 2021 Plans:</b> Development will continue to focus on the AFATDS v7.0 effort to include building fire support, fire control and fire direction role-based capabilities, integrating available CPCE common components, and updating the user interface for the application. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> No Engineering Change Proposals/surge anticipated in FY 2021.	24.096	38.317	34.081
<b>Title:</b> AFATDS 7.0 test events <b>Description:</b> IV&V and developmental testing.  <b>FY 2020 Plans:</b> IV&V testing. <b>FY 2021 Plans:</b> Development and Independent Validation and verification tests planned for AFATDS 7.0. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Live Fire, PVT and IV&V testing/support in FY 2021.	-	0.168	2.040
<b>Accomplishments/Planned Programs Subtotals</b>	26.289	43.898	41.371

<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>
• B28620: MOD OF IN-SVC EQUIP, AFATDS	7.401	4.083	5.494	-	5.494	7.292	7.392	6.693	0.900	0.000	39.255
<b>Remarks</b>											

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)	Project (Number/Name) EF8 / AFATDS Increment 1

**D. Acquisition Strategy**

The AFATDS v7.0 requirement was validated by the Joint Requirements Oversight Council (JROC) under the AFATDS Increment 2 Capability Definition Document (CDD) in June 2011. On 13 May 2015, the Army Acquisition Executive (AAE) approved AFATDS as a modification to the existing program baseline, continuing as an Acquisition Category (ACAT) II defense acquisition program (DAP) (non-Automated Information System) with PEO C3T oversight. The AFATDS 7.0 is a software only modification/modernization effort that will be hosted on already fielded hardware used for legacy AFATDS software.

The overall acquisition approach to delivering AFATDS 7.0 is to modernize and redesign the software to create a single software baseline featuring web services and a suite of Common Operating Environment (COE) applications that meet threshold values of all key performance parameters identified in the AFATDS Increment 2 CDD. The AFATDS Increment 2 CDD was approved under an IT Box construct, which promotes evolutionary development by facilitating requirement refinement and the incorporation of the latest technology. While the JROC Memorandum (JROCM) 083-11 validated the AFATDS 7.0 performance parameters, it also delegated authority for identifying and approving future capability requirements that fall within the CDD's scope to the Fires Support Command and Control (FSC2) Tactical Software Requirements Governance Board.

AFATDS 7.0 will be modernized using an incremental approach where capability is added to the overall baseline over the course of five (5) blocks. This approach provides the PM opportunity to deliver capabilities to users earlier in the process instead of waiting until AFATDS 7.0 is functionally complete, and also allows for feedback obtained during Product Validation Tests (PVTs) and Limited User Tests (LUTs) to be factored into later builds before the conclusion of the development contract. The overall concept behind AFATDS 7.0 is to re-build AFATDS legacy software using the latest software development technologies and methodologies to ensure a strong technical foundation is in place for continued expansion of capability (to address Long Range Precision Fires initiatives) and adoption of emerging technology initiatives, such as COE.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)	<b>Project (Number/Name)</b> EF8 / AFATDS Increment 1
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<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>			
Program Management Support for AFATDS (Core)	Sub Allot	PM Mission Command (MC) : APG, MD	4.008	-		-		-		-		-	0.000	4.008	-
Program Management Support for AFATDS (Matrix)	IA	Various Matrix Orgs (Govt) : Aberdeen PG, MD	2.800	0.969		1.993		0.817		-		0.817	0.000	6.579	-
Program Management Support for AFATDS (SETA Contr)	C/FFP	CRSA : Aberdeen PG, MD	1.783	0.827		1.634		1.919	Mar 2021	-		1.919	0.000	6.163	-
Program Management Support for AFATDS (FFRDC)	FFRDC	MITRE : APG, MD	0.200	0.183		0.761		1.545		-		1.545	0.000	2.689	-
Taxes	TBD	PEO C3T : APG, MD	-	0.214		1.025		0.969		-		0.969	0.000	2.208	-
<b>Subtotal</b>			8.791	2.193		5.413		5.250		-		5.250	0.000	21.647	N/A

<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>			
Software Development of AFATDS Version 6.8.1.1	C/CPFF	Raytheon Systems Corp. : Ft. Wayne, IN	21.636	-		-		-		-		-	0.000	21.636	33.188
Software Development of AFATDS Version 7.0	C/CPFF	Leidos : Aberdeen, MD	47.272	24.096		38.317		33.290	Jul 2021	-		33.290	0.000	142.975	-
<b>Subtotal</b>			68.908	24.096		38.317		33.290		-		33.290	0.000	164.611	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 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>			
Information Assurance and Engineering Support for AFATDS requirements	C/CPFF	CSC : Various Locations	1.060	-		-		-		-		-	0.000	1.060	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)	<b>Project (Number/Name)</b> EF8 / AFATDS Increment 1
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<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>			
Defensive Cyber Tools (T-PKI)	TBD	TBD : TBD	1.100	-		-		-		-		-	0.000	1.100	-
<b>Subtotal</b>			2.160	-		-		-		-		-	0.000	2.160	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>			
Government Confidence Demo for AFATDS V6.8.x requirements.	IA	Army Test & Evaluation Command (ATEC)/Fires Test Directorate (FTD) : Various Locations	0.626	-		-		-		-		-	0.000	0.626	-
Independent Verification and Validation of AFATDS V7.0 requirements	C/CPFF	Engility : Various Locations	1.538	-		0.168		0.718		-		0.718	0.000	2.424	-
Developmental Testing for AFATDS v7.0	IA	Multiple Govt Test Agencies (ATEC, ATC, EPG) : Multiple	0.750	-		-		2.113		-		2.113	0.000	2.863	-
<b>Subtotal</b>			2.914	-		0.168		2.831		-		2.831	0.000	5.913	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>		82.773	26.289	43.898	41.371	-	41.371	0.000	194.331	N/A

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)	<b>Project (Number/Name)</b> EF8 / AFATDS Increment 1

Event Name	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
V6.8.1.1 P2 Development	█	█																										
V6.8.1.1 P2 Customer Test		█																										
V7.0 Development Block 1	█	█	█	█	█	█	█	█	█	█	█	█																
Limited Deployment Decision Block 1							▲																					
V7.0 Development Block 2							█	█																				
V7.0 Product Verification Test Block 2											█																	
V7.0 Independent Verification and Validation Block 2											█																	
Limited Deployment Decision Block 2								▲																				
V7.0 Development Block 3									█	█	█	█																
Limited Deployment Decision Block 3																▲												
V7.0 Development Block 4											█	█	█	█														
Limited Deployment Decision Block 5																▲												
V7.0 Development Block 5																	█	█	█	█								

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)	<b>Project (Number/Name)</b> EF8 / AFATDS Increment 1

Event Name	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
V7.0 Product Verification Test Block 3													■															
V7.0 Independent Verification and Validation Block 3													■															
V7.0 FOTE Block 3													■															
Limited Deployment Decision Block 4													▲ 5															
V7.0 Independent Verification and Validation Block 4													■															
V7.0 Product Verification Test Block 4													■															
V7.0 Limited User Test Block 4													■															

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203728A / Joint Automated Deep Operation Coordination System (JADOCS)	<b>Project (Number/Name)</b> EF8 / AFATDS Increment 1

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
V6.8.1.1 P2 Development	1	2019	1	2019
V6.8.1.1 P2 Customer Test	2	2019	2	2019
V7.0 Development Block 1	1	2019	1	2021
Limited Deployment Decision Block 1	3	2020	3	2020
V7.0 Development Block 2	3	2020	1	2021
V7.0 Product Verification Test Block 2	2	2021	3	2021
V7.0 Independent Verification and Validation Block 2	1	2021	2	2021
Limited Deployment Decision Block 2	4	2020	4	2020
V7.0 Development Block 3	1	2021	4	2021
Limited Deployment Decision Block 3	4	2022	4	2022
V7.0 Development Block 4	4	2021	3	2022
Limited Deployment Decision Block 5	3	2022	3	2022
V7.0 Development Block 5	1	2023	3	2023
V7.0 Product Verification Test Block 3	4	2021	1	2022
V7.0 Independent Verification and Validation Block 3	1	2022	2	2022
V7.0 FOTE Block 3	2	2022	3	2022
Limited Deployment Decision Block 4	3	2023	3	2023
V7.0 Independent Verification and Validation Block 4	3	2022	4	2022
V7.0 Product Verification Test Block 4	4	2022	1	2023
V7.0 Limited User Test Block 4	1	2023	1	2023

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>					<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</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	-	321.513	277.633	268.919	-	268.919	218.391	135.229	121.242	103.734	Continuing	Continuing
280: <i>RECOV VEH IMPROV PROG</i>	-	24.852	66.752	137.583	-	137.583	92.630	58.572	7.823	0.000	Continuing	Continuing
330: <i>Abrams Tank Improve Prog</i>	-	159.688	119.645	83.546	-	83.546	67.899	62.982	99.503	89.527	Continuing	Continuing
371: <i>Bradley Improve Prog</i>	-	81.125	47.779	14.815	-	14.815	23.292	0.000	0.000	0.000	Continuing	Continuing
431: <i>M113 IMPROVEMENTS</i>	-	7.615	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.615
EE2: <i>Stryker Improvement</i>	-	48.233	43.457	32.975	-	32.975	34.570	13.675	13.916	14.207	0.000	201.033

**Note**

In Fiscal Year (FY) 2021, \$356 thousand in Reimbursable Manpower for Program Element (PE) 0203735A Combat Vehicle Improvement Programs Project 330 Abrams Tank Improve Prog has been realigned from Reimbursable Civilian Funding to Direct Operations and Maintenance. Program support costs have been accurately updated to reflect the realignment.

In FY 2021, \$.534 million in Reimbursable Manpower for PE 0203735A Combat Vehicle Improvement Programs Project EE2 Stryker Improvement has been realigned from Reimbursable Civilian Funding to Direct Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments. FY 2021 funding request was reduced by \$14.019 million to account for the availability of prior execution balances.

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

PE 0203735A Combat Vehicle Improvement Programs corrects vehicle deficiencies identified during Army operations; continues technical system upgrades to include the integration of applicable technologies on ground systems; addresses needed evolutionary enhancements to tracked combat vehicles; and develops technology improvements which have application to or insertion opportunities across multiple Ground Combat Systems vehicles. This PE provides combat effectiveness and Operating and Support (O&S) cost reduction enhancements for the Abrams tanks, Bradley Fighting Vehicles and Stryker Family of Vehicles (FOVs) through a series of product improvements.

The strategy for Abrams and Bradley will focus on incrementally delivering capability to the warfighter to meet both near-term limitations as well as mitigating gaps and maintaining combat overmatch in the future. This effort was approved by the Army Acquisition Executive in 3rd Quarter (QTR) Fiscal Year (FY) 2011.

The Recovery Vehicle Improvement program is a group of Engineering Change Proposals (ECPs) that will allow the current recovery vehicle to regain Single Vehicle Recovery (SVR) for the heaviest tracked combat vehicle as defined in the Heavy Equipment Recovery Combat Utility Lift and Evacuation System (HERCULES) Enhanced M88A2E1 Capability Production Document Increment 2 dated 20 January 2017. The fielded M88A2 HERCULES lacks the necessary power, weight, and braking ability to safely support the recovery of the M1A2SEPV2 in all situations and with the next generation M1A2SEPV3 weight growth, the problem will get worse. The M88A3 HERCULES vehicles will bring back the operational capability of the single vehicle recovery. The increased winching and lifting capability accommodates

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	
<p>all 80 ton Abrams variants. Without this increased capability, units must use two M88A2 Medium Recovery Vehicles to perform the necessary spectrum of recovery operations.</p> <p>The Abrams M1A2 SEP V2 and M2/M3A3 Bradley Fighting Vehicles are at or exceed Space, Weight, and Power-Cooling (SWaP-C) limitations. In order to host and restore lost platform capability, the Abrams Tank and Bradley Fighting Vehicle programs will execute a series of ECPs to support the current embedded systems and to facilitate integration of technologies currently in development under other existing Programs of Record. The ECPs are not intended to exceed the operational capability outlined in current system requirements documents, but rather to ensure that the existing system performance is not further degraded and that Army mission equipment packages can be integrated on the Abrams and Bradley Platforms.</p> <p>Stryker Improvement will address the development of Lethality, Survivability, Mobility, Network Lethality, and Communication, Command and Control (C3) improvements within the Stryker FoV. Principal development efforts include upgrades associated with the Stryker Double V-Hull (DVH) A1 ECP, Stryker 30mm Infantry Carrier Vehicle Dragoon (ICVD) Operational Needs Statement (ONS), Common Remotely Operated Weapon Station-Javelin (CROWS-J) ONS, Stryker Survivability Enhancement, and Stryker Lethality ECPs. DVH A1 ECP power generation, suspension, and network upgrades restores Stryker DVH Space, Weight, and SWaP-C lost as a result of incorporating vehicle changes to counter threats encountered during deployment operations while allowing the future network to be hosted without further degradation in vehicle protection and mobility. The Stryker 30mm ICVD and CROWS-J ONS efforts addressed Urgent Operational Need to increase the firepower of Stryker Infantry Carrier Vehicles (ICV) within the US Army European Command (USAREUR). The 30mm ICVD ONS effort integrates a 30mm-equipped weapon station providing, USAREUR with precision direct firepower to overwhelm the enemy in encounter actions and suppressive fire to preserve mounted and dismounted freedom of movement. The Stryker Survivability Enhancement will address evolving threats by assessing survivability improvements, to include passive protection systems, active protection systems, an under-armor fire capability for Stryker-equipped reconnaissance troops, 360 Situational Awareness, and reactive armor tiles. Stryker Fire Direction Center (FDC) Variant will provide an on-the move, protective vehicle that processes voice and digital information in a timely manner while maintaining contact with the indirect fire team over extended distances. Stryker Lethality ECP efforts focus on the integration of a suite of complementary Mission Equipment Package (MEP) lethality upgrades (medium caliber weapon ECP, CROWS-J ECP, Anti-Tank Guided Missile (ATGM) ECP, common masted sensor ECP, and other capabilities) that will improve the suppressive fire and armored vehicle engagement capabilities across the Army's Stryker Brigade Combat Teams (SBCTs) and address Remote Weapon Station (RWS) and Modified Improved Target Acquisitions System (MITAS) obsolescence issues that will impact fleet sustainment beginning in FY 2020. The ATGM ECP will upgrade the MITAS, incorporate a far target locator and disseminate target acquirement information utilizing network lethality, providing a common operating picture.</p>		

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement 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	336.063	334.463	273.052	-	273.052
Current President's Budget	321.513	277.633	268.919	-	268.919
Total Adjustments	-14.550	-56.830	-4.133	-	-4.133
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-56.830			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-14.550	-			
• Adjustments to Budget Years	-	-	-4.133	-	-4.133

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>				<b>Project (Number/Name)</b> 280 / <i>RECOV VEH IMPROV PROG</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>
280: <i>RECOV VEH IMPROV PROG</i>	-	24.852	66.752	137.583	-	137.583	92.630	58.572	7.823	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The M88A2 Heavy Equipment Recovery Combat Utility Lift and Evacuation System (HERCULES), designated as an Acquisition Category (ACAT IC) program on 15 Jun 2016, has been providing towing, winching, and hoisting operations to support battlefield recovery operations and evacuation of heavy tanks and other tracked combat vehicles since its production and deployment in 1998. The HERCULES recovers tanks mired to different depths, removes M1 Abrams turrets and power packs, and uprights overturned heavy combat vehicles. Currently, the M88A2 is unable to safely perform Single Vehicle Recovery (SVR) of the Abrams tank in all conditions, due to added weight/survivability improvements made to the tank. In order to ensure SVR is met, Project Director- Main Battle Tank Systems (PD-MBTS) will develop and integrate Engineering Change Proposal (ECP) technologies for the M88A2 HERCULES through an Operations and Support (O&S) initiative to meet its operational requirements of SVR throughout its life cycle. This initiative is not intended to exceed current operational capability, but will instead regain SVR capability of the heaviest tracked combat vehicle.

Analyses conducted to date suggests that upgrades to the M88A2 track, suspension, hydraulics, engine, transmission and other related components are required to meet single vehicle recovery for the heaviest tracked combat vehicle.

Fiscal Year (FY) 2021 Base dollars will continue the design, development, integration, prototype build, and continue Government Systems Engineering and Program Management office support. This will include labor, training, travel, supplies, and equipment to effectively manage the program. The prototype vehicles will enter testing in FY 2022 to confirm technical solutions meet performance requirements.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Program Management Office (PMO) Support	2.123	2.127	3.457
<b>Description:</b> Program Management Office Support includes Systems Engineering, Government and in-house support Contractor salaries, travel and other support costs required to effectively manage the program.			
<b>FY 2020 Plans:</b> Oversight of Other Transaction Authority (OTA) project agreement holder, technical solution development, prototype build and preparation of follow-on OTA production contract(s). Continue Government Systems Engineering and Program Management office support in FY 2020. This will include labor, training, travel, supplies, and equipment to effectively manage the program.			
<b>FY 2021 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 280 / <i>RECOV VEH IMPROV PROG</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>The program continues OTA project oversight, supports technical solution development for continued M88A3 prototype builds and continued preparation of follow-on OTA production contract(s). Continue Government Systems Engineering and Program Management office support in FY 2021. This will include labor, training, travel, supplies, and equipment to effectively manage the program.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Contract award and ramping up of efforts will require additional government and in-house contractor Program Management Support.</p>			
<p><b>Title:</b> Product Development</p> <p><b>Description:</b> Design, and Development of ECPs.</p> <p><b>FY 2020 Plans:</b> Funding supported contractor development of the M88A3 Single Vehicle Recovery ECP, designed maturity review, supported subsystem technical review, finalized design to support vehicle integration activities in late FY 2020 and early FY 2021.</p> <p><b>FY 2021 Plans:</b> The program continues development of M88A3 prototype builds, component qualification testing and system level verification (SLV) testing, finalize design and integration activities in FY 2021.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The increase in FY 2021 will be used for ramp-up of the design and development effort, as well as build up to 9 prototype vehicles; this is a continuation of the efforts awarded in FY 2019 and FY 2020.</p>	22.729	64.625	134.126
<b>Accomplishments/Planned Programs Subtotals</b>	24.852	66.752	137.583

<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>
• GA0570: <i>Improved Recovery Vehicle (M88A2 HERCULES)</i>	172.853	80.146	0.000	-	0.000	186.816	184.813	199.801	200.800	0.000	1,025.229
• G80571: <i>M88 FOV MODS</i>	4.517	4.500	18.382	-	18.382	16.484	6.993	-	-	Continuing	Continuing
<b>Remarks</b>											



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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 280 / <i>RECOV VEH IMPROV PROG</i>

**D. Acquisition Strategy**

The Project Director (PD) for MBTS intends to execute an ECP to regain single vehicle recovery capability of the M88A2 HERCULES vehicle. The strategy is to utilize the Detroit Arsenal Automotive Other Transaction Authority (DA2 OTA) to competitively award a single contract to develop, integrate and produce up to 9 prototype vehicles that will enter testing in FY 2022. After achieving OTA success criteria, a follow-on OTA will be awarded using procurement dollars to produce up to 70 initial production vehicles; with long lead items procured in FY 2022, and production starting in FY 2023. Federal Acquisition Regulation (FAR) based contracts will be awarded to complete production of the remaining vehicles up to the Army Acquisition Objective (AAO).

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 280 / <i>RECOV VEH IMPROV PROG</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	Various	Various : TBD	10.798	22.729	Aug 2019	64.625	Jan 2020	134.126	Jan 2021	-		134.126	0.000	232.278	-
<b>Subtotal</b>			10.798	22.729		64.625		134.126		-		134.126	0.000	232.278	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			
Program Management Office (PMO) Support	MIPR	PMO Support Offices : Various	1.500	2.123	Jan 2019	2.127	Jan 2020	3.457	Jan 2021	-		3.457	0.000	9.207	-
<b>Subtotal</b>			1.500	2.123		2.127		3.457		-		3.457	0.000	9.207	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	0.502	-		-		-		-		-	0.000	0.502	-
<b>Subtotal</b>			0.502	-		-		-		-		-	0.000	0.502	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>			12.800	24.852		66.752		137.583		-		137.583	0.000	241.987	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 280 / <i>RECOV VEH IMPROV PROG</i>

Event Name	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
M88A3 ECP Pre-Contract Award Activity	██████████				██████████																							
M88A3 ECP OTA Award																												
M88A3 ECP Design/Develop Prototype Build/Component Qualification/SLV Testing					██████████				██████████				██████████															
Test Readiness Review (TRR)																												
M88A3 ECP Government Testing													██████████															
M88A3 ECP Production OTA Award, Funded with Procurement																												
M88A3 ECP Fielding Start Date (First Unit Equipped)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 280 / <i>RECOV VEH IMPROV PROG</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
M88A3 ECP Pre-Contract Award Activity	3	2018	3	2019
M88A3 ECP OTA Award	4	2019	4	2019
M88A3 ECP Design/Develop Prototype Build/Component Qualification/SLV Testing	4	2019	2	2022
Test Readness Review (TRR)	4	2021	4	2021
M88A3 ECP Government Testing	2	2022	3	2023
M88A3 ECP Production OTA Award, Funded with Procurement	4	2023	4	2023
M88A3 ECP Fielding Start Date (First Unit Equipped)	3	2025	3	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>				<b>Project (Number/Name)</b> 330 / <i>Abrams Tank Improve Prog</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>
330: <i>Abrams Tank Improve Prog</i>	-	159.688	119.645	83.546	-	83.546	67.899	62.982	99.503	89.527	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In Fiscal Year (FY) 2021, \$356 thousand in Reimbursable Manpower for Program Element (PE) 0203735A Combat Vehicle Improvement Programs Project 330 Abrams Tank Improve Prog has been realigned from Reimbursable Civilian Funding to Direct Operations and Maintenance. Program support costs have been accurately updated to reflect the realignment.

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

The Army has approved Engineering Change Proposals (ECPs) for the Abrams Main Battle Tank to restore lost capability, host inbound technologies, and to meet objective performance requirements called out in approved platform requirements documents. The strategy for Abrams will focus on incrementally delivering capability to the warfighter to meet both near-term limitations as well as mitigating gaps and maintaining combat overmatch in the future. This approach was approved by the Army Acquisition Executive in 3rd Quarter (Q) FY 2011.

The Abrams vehicle is at or exceeds Space, Weight, and Power-Cooling (SWaP-C) limitations. In order to restore lost platform capability, the Abrams Tank will execute a series of ECPs to support the current embedded systems and to facilitate integration of technologies currently in development. The ECPs are not intended to exceed the operational capability outlined in current system requirements documents, but rather to ensure that the existing system performance is not further degraded and that Army mission equipment packages can be integrated on the Abrams. The ECPs will incorporate lost power generation and distribution technologies, lethality improvements, force protection and survivability improvements to counter evolving threats to include, but not limited to Active Protection Systems, technologies to mitigate obsolescence issues, in-bound technologies under development technologies to decrease the overall weight of the tank, and technologies in support of any validated Army requirement.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Abrams Power Engineering Change Proposal M1A2SEP V3/ECP 1A	4.000	11.709	-
<b>Description:</b> The improvements implemented through the M1A2SEP v3/ECP 1A Abrams Power program will restore lost power generation and distribution, mitigate impending obsolescence, and incorporate inbound technologies currently under development.			
<b>FY 2020 Plans:</b> The United States Government (USG) completed Production Qualification Testing (PQT), logistics product development, engineering actions following the completion of USG testing, and contract close out actions.			
<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 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 330 / <i>Abrams Tank Improve Prog</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
The SEP v3 contract is complete in FY 2020 and no additional funds are required for FY 2021.				
<b>Title:</b> Training Device Updates		0.491	-	-
<b>Description:</b> Development and design of training device upgrades to reflect upgrades to the vehicle.				
<b>Title:</b> Abrams Lethality Engineering Change Proposal M1A2SEP V4/ECP 1B		135.600	91.535	58.963
<b>Description:</b> The Abrams SEP v4 program consists of lethality improvements primarily focused on the integration of 3rd Gen Forward Looking Infrared (FLIR) and the Advanced Multi-Purpose (AMP) round. Additional improvements include a Laser Warning Receiver (LWR), Improved Thermal Management System (ITMS), and target acquisition sensor upgrades consisting of inclusion of color cameras, laser capabilities, and image processing. Other potential improvements include vehicle smoke generation, survivability enhancements, signature management improvements, embedded training enhancements, 360 situational awareness cameras, and weight reduction efforts. Trade studies, analysis and technology maturation will be performed to evaluate prospective improvements, along with obsolescence mitigation, and incorporation of inbound technologies currently under development.				
<b>FY 2020 Plans:</b> SEP V4 completed a Critical Design Review (CDR) in 1Q FY 2020, begun component qualification testing, and continued prototype vehicle build planning. The primary tasks focused on systems engineering, test planning, prototype hardware procurement, software development, logistics planning, and Technical Data Package (TDP) development. Final hardware to be used for component qualification testing.				
<b>FY 2021 Plans:</b> The program will complete prototype vehicle build, component qualification testing, and Original Equipment Manufacturer (OEM) vehicle testing. The USG will conduct a Test Readiness Review (TRR) in preparation to begin USG vehicle testing in FY 2022.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The funding decrease is due to a majority of subcontractors completing their hardware deliveries and all design activities. The overall program activities will switch from heavy engineering efforts to mostly test and production planning support.				
<b>Title:</b> Program Management Office (PMO) Support		7.873	7.473	5.760
<b>Description:</b> Program Management Office Support includes Systems Engineering and Government and Contractor salaries, travel and other support costs required to effectively manage the program.				
<b>FY 2020 Plans:</b>				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 330 / <i>Abrams Tank Improve Prog</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Continued Government Systems Engineering and Program Management office support in FY 2020. This included labor, training, travel, supplies, and equipment to effectively manage the program.  <b>FY 2021 Plans:</b> Will continue Government Systems Engineering and Program Management office support in FY 2021. This will include labor, training, travel, supplies, and equipment to effectively manage the program  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The decrease is due to the completion of the SEP v3 developmental contract in FY 2020. In FY 2021, \$356K in Reimbursable Manpower for this line has been realigned from Reimbursable Civilian Funding to Direct Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments.				
<b>Title:</b> Test & Evaluation  <b>Description:</b> Test and Evaluation activities includes contractor and government testing, as well as test documentation development. Contractor shakedown/proveout testing will be conducted using U.S. Army test facilities. Government development testing of prototype vehicles will evaluate vehicle performance, to include Reliability, Availability, and Maintainability testing. Early User evaluation will also be performed. Test and evaluation activities also include the testing of other platform inbound technologies, along with the development of test documentation to include Test and Evaluation Master Plans, test procedures, and reports.  <b>FY 2020 Plans:</b> The USG completed any remaining SEP V3 and AMP testing.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The decrease is due to the completion of the SEP v3 developmental contract and corresponding testing in FY 2020.		10.127	3.660	-
<b>Title:</b> Test & Evaluation - Engineering Change Proposal M1A2SEP V4/ECP 1B  <b>Description:</b> Comprises government and contractor test and evaluation of the SEP V4. Testing will cover component qualification testing, detailed vehicle test planning, and initial test site preparation.  <b>FY 2020 Plans:</b> Begun SEP V4 testing and evaluation. Testing included component qualification testing, detailed vehicle test planning, and initial test site preparation (spares, test equipment, instrumentation, etc.).  <b>FY 2021 Plans:</b> Continues SEPV4 testing and evaluation. Increase in funding supports continued conduct of USG component qualification testing and vehicle testing, vehicle test planning, continued test site preparation (spares, test equipment, instrumentation, etc.).		-	3.268	16.823

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 330 / <i>Abrams Tank Improve Prog</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 to FY 2021 Increase/Decrease Statement:</b> OEM vehicle testing will begin at USG test sites and this will significantly ramp up the test costs compared to the test site planning and preparation in FY 2020.</p> <p><b>Title:</b> Lethality and Survivability Enhancements</p> <p><b>Description:</b> Enhances lethality primarily through integration of improved munitions (smart rounds), gun turret drive improvements, cannon improvements, image processing enhancements and advanced algorithms. Survivability enhancements will focus on improved sensors, 360 situational awareness, active protection systems, armor improvements, and unmanned system defeat.</p> <p><b>FY 2020 Plans:</b> Abrams continued the integration of next generation smart rounds, survivability enhancements, and improved sensors (such as 360 SA, Laser Warning Receiver, or other emerging technology).</p> <p><b>FY 2021 Plans:</b> Abrams will continue the integration of next generation smart rounds, survivability enhancements, and improved sensors (such as 360 SA, Laser Warning Receiver, or other emerging technology).</p> <p><b>Title:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun</p>	1.437	2.000	2.000
<b>Accomplishments/Planned Programs Subtotals</b>	159.688	119.645	83.546

<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>
• GA0750: <i>Abrams Upgrade Program</i>	1,527.243	1,746.007	807.253	-	807.253	1,117.837	1,432.396	1,410.176	1,577.193	Continuing	Continuing
• GA0700: <i>M1 Abrams Tank (MOD)</i>	959.041	353.292	392.013	-	392.013	374.060	387.201	389.299	497.035	Continuing	Continuing

**D. Acquisition Strategy**  
Abrams SEPV3: Research & Development Contract - Sole Source, Cost Plus Incentive Fee (CPIF); SEPV4 - Research & Development Contract - Sole Source, CPIF.



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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0203735A / Combat Vehicle Improvement Programs				Project (Number/Name) 330 / Abrams Tank Improve Prog							
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
Abrams SEP V3	SS/CPIF	General Dynamics Land Systems : Sterling Heights, MI	335.032	4.000	Feb 2019	11.709	Feb 2020	-		-		-	Continuing	Continuing	Continuing
SEP V3 Training Device Upgrades	MIPR	PEO, STRI : Orlando, FL	3.761	0.491	Dec 2018	-		-		-		-	Continuing	Continuing	Continuing
Abrams SEP V4	SS/CPIF	General Dynamics Land Systems : Sterling Heights, MI	95.582	135.600	Nov 2018	91.535	Nov 2019	58.963	Nov 2020	-		58.963	Continuing	Continuing	Continuing
Advanced Multi-Purpose (AMP) Round	SS/CPIF	General Dynamics Land Systems : Sterling Heights, MI	7.128	-		-		-		-		-	Continuing	Continuing	-
Lethality and Survivability Enhancements	Option/CPFF	General Dynamics Land Systems (GDLS) : Sterling Heights, MI	53.388	1.437	Apr 2019	2.000	Mar 2020	2.000	Mar 2021	-		2.000	Continuing	Continuing	-
<b>Subtotal</b>			494.891	141.528		105.244		60.963		-		60.963	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
Program Management Office (PMO)Support	MIPR	PMO Support Offices : Various	78.994	7.873	Jan 2019	7.473	Jan 2020	5.760	Jan 2021	-		5.760	Continuing	Continuing	Continuing
Program Management Office (PMO) Support - Survivability Enhancements	MIPR	PMO Support Offices : Various	2.207	-		-		-		-		-	0.000	2.207	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	TBD : TBD	-	0.160		-		-		-		-	0.000	0.160	-
<b>Subtotal</b>			81.201	8.033		7.473		5.760		-		5.760	Continuing	Continuing	N/A

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 330 / <i>Abrams Tank Improve Prog</i>
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Test and Evaluation (\$ 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			
Government Testing	MIPR	Aberdeen Proving Ground; Yuma Proving Ground; White Sands Missile Range, : Various	48.382	10.127	Jan 2019	2.000	Jan 2020	2.915	Jan 2021	-		2.915	Continuing	Continuing	Continuing
Government Testing SEP V3	MIPR	Various : Various	-	-		1.239	Jan 2020	-		-		-	Continuing	Continuing	-
Contractor Testing SEP V3	Various	Various : Various	38.903	-		1.660	Feb 2020	-		-		-	Continuing	Continuing	Continuing
Contractor Testing SEP V4	Various	Various : Various	-	-		2.029	Feb 2020	13.908	Feb 2021	-		13.908	Continuing	Continuing	-
Government Testing - Survivability Enhancements	Various	Various : Various	24.491	-		-		-		-		-	0.000	24.491	-
<b>Subtotal</b>			111.776	10.127		6.928		16.823		-		16.823	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			687.868	159.688		119.645		83.546		-		83.546	Continuing	Continuing	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 330 / <i>Abrams Tank Improve Prog</i>

Event Name	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
SEP V3 Live Fire Test & Evaluation (LFT&E)	████████																											
SEP V3 Production Qualification Testing (PQT)	████████████████																											
SEP V3 Follow-on Test and Evaluation (FOT&E)			████																									
SEP V3 Fielding Start Date (First Unit Equipped)																									▲ 2			
SEP V4 Critical Design Review (CDR)					▲ 1																							
SEP V4 Test Readiness Review													▲ 3															
SEP V4 USG Testing					██																							
SEP V4 Log Demo																	████											
SEP V4 Materiel Release																									▲ 4			
SEP V4 First Unit Equipped																									▲ 5			
Future Capability Enhancements																					██							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 330 / <i>Abrams Tank Improve Prog</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SEP V3 Live Fire Test & Evaluation (LFT&E)	1	2018	3	2019
SEP V3 Production Qualification Testing (PQT)	4	2018	2	2020
SEP V3 Follow-on Test and Evaluation (FOT&E)	3	2019	3	2019
SEP V3 Fielding Start Date (First Unit Equipped)	4	2020	4	2020
SEP V4 Critical Design Review (CDR)	1	2020	1	2020
SEP V4 Test Readiness Review	4	2021	4	2021
SEP V4 USG Testing	2	2020	4	2023
SEP V4 Log Demo	2	2023	3	2023
SEP V4 Materiel Release	3	2024	3	2024
SEP V4 First Unit Equipped	4	2024	4	2024
Future Capability Enhancements	2	2024	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>				<b>Project (Number/Name)</b> 371 / <i>Bradley Improve Prog</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>
371: <i>Bradley Improve Prog</i>	-	81.125	47.779	14.815	-	14.815	23.292	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Bradley Fighting Vehicle will continue to be a major combat vehicle in the Army Operational Force for the next 15-20 years. Current modernization efforts, such as the Track and Suspension Engineering Change Proposal (ECP) and the A4 Mobility ECP, address current space, weight, and power-cooling (SWAP-C) limitations. The Bradley will continue to modernize to support additional capabilities required to counter evolving threats in multi-domain operations including, but not limited to improved vehicle diagnostics and systems to increase maintainability, mobility, survivability, sensor digitization, improved power distribution, and cyber and software improvements. These improvements increase the Bradley Fighting Vehicle's ability to survive in a cyber and electronic warfare permissive environment.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Bradley A4 ECP Program</p> <p><b>Description:</b> Current projections indicate the Bradley Fighting Vehicle and the Bradley Fire Support Vehicle will remain in the armored brigade combat team (ABCT) formation until the 2050s. Given this, additional Research and Development (R&amp;D) is required to keep the force relevant. The Bradley Fighting Vehicle System (BFVS) improvements implemented through the ECP Program will focus on restoring lost platform capability and provide capacity to support Army inbound technologies and to facilitate integration of technologies currently in development under other existing programs of record.</p> <p><b>FY 2020 Plans:</b> Provided funding for the development of maintenance training devices related to A4 (Mobility).</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Fiscal Year (FY) 2020 to FY 2021 decrease to reflect the reduction in efforts needed to complete development to A4.</p>	23.392	11.443	-
<p><b>Title:</b> Survivability Enhancements</p> <p><b>Description:</b> Developing force protection and survivability improvements to counter evolving threats to include, but not limited to the underbelly interim solution (UBIS). The Bradley Fighting Vehicle (BFV) will integrate underbelly armor for improved survivability against underbelly blast events.</p> <p><b>FY 2020 Plans:</b> Engineering, logistics, test, and program management continued development; completed contractor testing; conducted USG testing; and completed the logistics support Maintenance Allocation Chart (MAC), provisioning plan, tested support package,</p>	0.025	2.249	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 371 / <i>Bradley Improve Prog</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Modification Work Order (MWO) development, and Logistics Demonstration (LOGDEMO) of the Underbelly Interim Solution (UBIS). Integration analysis, installation assessment and engineering support for execution of Bradley modifications. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2020 to FY 2021 decrease is due to survivability efforts transitioning to production.				
<b>Title:</b> Program Management Office (PMO) Support <b>Description:</b> Program Management Office Support includes systems engineering, government and contractor salaries, travel, training and other support costs required to effectively manage the program. <b>FY 2020 Plans:</b> Continued government program management and system engineering support costs. These funds covered the costs of government and direct support contractor salaries, travel, training, supplies, equipment and facilities to manage the issues resulting from Bradley A4 ECP testing and developing logistics products and executed UBIS and other development activities. <b>FY 2021 Plans:</b> Will continue government program management and system engineering support costs. These funds will cover the costs of government and direct support contractor salaries, travel, training, supplies, equipment and facilities to manage the issues resulting from Bradley A4 ECP testing and developing logistics products and other development activities. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2020 to FY 2021 decrease is due to personnel support costs transitioning to production.		6.361	5.560	1.481
<b>Title:</b> Test & Evaluation <b>Description:</b> Test & Evaluation efforts support developmental and operational test events. These events include test planning, system and subsystem testing, and development of test documentation. <b>FY 2020 Plans:</b> Conducted Bradley A4 Operational Testing and continue MWO, current fleet enhancement, and Bradley improvement test activities. <b>FY 2021 Plans:</b> Provides funding to test additional Bradley modifications to include, but not limited to, diagnostics and vehicle software qualification testing, and sensor digitization. It also provides funding to support test asset overhaul. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>		6.561	16.235	3.440

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 371 / <i>Bradley Improve Prog</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
FY2020 to FY2021 decrease is due to ramping down A4 Operational Testing.			
<b>Title:</b> Current Fleet Enhancements <b>Description:</b> Current fleet enhancement efforts support development and integration of capabilities to the current Bradley Family of Vehicles fleet to maintain the Bradley's battlefield dominance against current and future threats.	2.580	-	-
<b>Title:</b> Bradley Improvements <b>Description:</b> Provides funding for the analysis, engineering, development, and integration to support Army directed inbound technologies and other improvements to the Bradley vehicles. <b>FY 2020 Plans:</b> Conducted integration activities for Army directed improvements and inbound technologies such as, but not limited to, diagnostics and powertrain issues, force protection and system survivability enhancements, and increased situational awareness. <b>FY 2021 Plans:</b> Will conduct integration activities for Army directed improvements and inbound technologies such as, but not limited to, power architecture, sensor digitization, force protection, system survivability enhancements, diagnostics, and cyber security. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2020 to FY 2021 decrease is due to completion of development efforts	17.150	12.292	9.894
<b>Title:</b> FY 2019 Rescission <b>Description:</b> FY 2019 Rescission	25.000	-	-
<b>Title:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun <b>Description:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun	0.056	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	81.125	47.779	14.815

<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>
• GZ2400: <i>Bradley Program (MOD)</i>	514.424	415.740	493.109	-	493.109	467.648	261.313	54.993	30.562	Continuing	Continuing
• G80718: <i>BRADLEY PROGRAM</i>	205.000	-	0.000	-	0.000	-	-	-	-	0.000	205.000
<b>Remarks</b>											

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 371 / <i>Bradley Improve Prog</i>

**D. Acquisition Strategy**

Product Manager Bradley will execute modification work orders following completion of development to support integrating FY 2021 funded capabilities into the formation at an average rate of three Battle Command Trainings (BCTs) per year. Software capability upgrades, including cyber, will be included in the next iteration of Voice, Video and Integrated Data (VVID) software in FY 2022 - 2023 time frame. The improved power distribution funding supports a Critical Design Review decision in late FY 2021/ early FY 2022 to continue development.



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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0203735A / Combat Vehicle Improvement Programs				Project (Number/Name) 371 / Bradley Improve Prog							
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
Bradley A4 Engineering Change Proposal (ECP) Program	MIPR	PMO : Warren, Picatinny NJ	79.009	23.392	Sep 2019	-		-		-		-	0.000	102.401	-
Non Recurring Engineering- Bradley A4 ECP	SS/CPIF	BAE : Sterling Heights, MI	276.530	-		-		-		-		-	0.000	276.530	-
Non Recurring Engineering- Bradley A4 ECP TADDS	TBD	TBD : TBD	-	-		11.443	Mar 2020	-		-		-	0.000	11.443	-
Survability Enhancements - Underbelly Armor	SS/ Various	TBD : TBD	0.182	0.025	Apr 2019	2.249	Sep 2020	-		-		-	0.000	2.456	-
Current Fleet Enhancements	SS/ Various	TBD : TBD	-	2.580	Aug 2019	-		-		-		-	Continuing	Continuing	Continuing
Bradley Improvements	MIPR	TBD : TBD	34.531	17.150		12.292	Mar 2020	4.359	Sep 2021	-		4.359	Continuing	Continuing	Continuing
Bradley Improvements - IBAS	SS/TBD	DRS : Melbourne, FL	-	-		-		2.958	Dec 2020	-		2.958	Continuing	Continuing	Continuing
Bradley Improvements - Power Architecture	SS/TBD	BAE : Sterling Heights, MI	-	-		-		2.577	Jul 2021	-		2.577	Continuing	Continuing	Continuing
<b>Subtotal</b>			390.252	43.147		25.984		9.894		-		9.894	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
PMO/PEO Support/OGA	MIPR	PMO/PEO : Bradley ECP Program	31.936	3.585	Dec 2018	3.360	Dec 2020	1.036	Dec 2020	-		1.036	Continuing	Continuing	Continuing
Government Engineering Support	MIPR	Various : Bradley ECP Program	48.204	2.776	Dec 2018	2.200	Dec 2020	0.445	Dec 2020	-		0.445	Continuing	Continuing	Continuing
FY 2019 Rescission	TBD	FY 2019 Pending Rescission : TACOM	-	25.000	Dec 2019	-		-		-		-	0.000	25.000	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0203735A / Combat Vehicle Improvement Programs				371 / Bradley Improve Prog							
<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			
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	FY 2018 NDAA SEC 825 MDAP Cost Overrun : TACOM	-	0.056		-		-		-		-	0.000	0.056	-
<b>Subtotal</b>			80.140	31.417		5.560		1.481		-		1.481	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 Testing	MIPR	Various : Test Sites	42.991	6.561	Jan 2019	16.235	Jul 2020	3.440	Jul 2021	-		3.440	Continuing	Continuing	Continuing
<b>Subtotal</b>			42.991	6.561		16.235		3.440		-		3.440	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			513.383	81.125		47.779		14.815		-		14.815	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 371 / <i>Bradley Improve Prog</i>	

Event Name	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
Bradley M2A4 Engineering Change Proposal (ECP) Program	[Redacted]																											
Production Qualification Test (PQT) - Bradley A4 ECP	[Redacted]																											
Operational Test and Evaluation - Bradley A4 ECP																												
Development Contract - UBIS																												
Bradley Improvements - Sensor Digitization - IBAS Development																												
Bradley Improvements - Sensor Digitization - SA																												
Bradley Improvements - Power Architecture																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 371 / <i>Bradley Improve Prog</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Bradley M2A4 Engineering Change Proposal (ECP) Program	1	2012	3	2021
Production Qualification Test (PQT) - Bradley A4 ECP	2	2016	2	2019
Operational Test and Evaluation - Bradley A4 ECP	4	2020	2	2021
Development Contract - UBIS	4	2019	3	2020
Bradley Improvements - Sensor Digitization - IBAS Development	4	2019	1	2022
Bradley Improvements - Sensor Digitization - SA	2	2020	4	2022
Bradley Improvements - Power Architecture	4	2019	2	2022

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 431 / M113 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
431: M113 IMPROVEMENTS	-	7.615	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.615
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

M113 improvements will develop an affordable solution for upgrading the M113s to enhance protection, survivability, mobility and power generation to support the current and future network systems. This will provide the necessary enhancements to the M113 capability for Echelons Above Brigade (EAB) units with priority to the forward deployed units and equipment sets. The Armored Multi Purpose Vehicle (AMPV) program will replace all M113 family of vehicles in Armored Brigade Combat Teams (ABCT).

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

	FY 2019	FY 2020	FY 2021
<b>Title:</b> Product Development	6.015	-	-
<b>Description:</b> Design, fabrication and testing of Engineering Change Proposals (ECPs).			
<b>Title:</b> Government Program Management	1.600	-	-
<b>Description:</b> Program Management Office Support includes Systems Engineering, support to logistics development, Government salaries, travel, training and other support costs required to effectively manage the program.			
<b>Accomplishments/Planned Programs Subtotals</b>	7.615	-	-

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 431 / <i>M113 IMPROVEMENTS</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			
Product Development	C/FFP	TBD : TBD	-	6.015	May 2019	-		-		-		-	0.000	6.015	-
Program Management Support	MIPR	TBD : TBD	-	1.600	May 2019	-		-		-		-	0.000	1.600	-
<b>Subtotal</b>			-	7.615		-		-		-		-	0.000	7.615	N/A
<b>Project Cost Totals</b>			-	7.615		0.000		-		-		-	0.000	7.615	N/A

**Remarks**  
Program has been cancelled.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 431 / M113 IMPROVEMENTS
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	<b>FY 2012</b>				<b>FY 2013</b>				<b>FY 2014</b>				<b>FY 2015</b>				<b>FY 2016</b>				<b>FY 2017</b>				<b>FY 2018</b>			
	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

RFP Release																														
Contract Award																														
Test																														

	<b>FY 2019</b>				<b>FY 2020</b>				<b>FY 2021</b>				<b>FY 2022</b>				<b>FY 2023</b>				<b>FY 2024</b>				<b>FY 2025</b>			
	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

RFP Release																													
Contract Award																													
Test																													

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> 431 / M113 IMPROVEMENTS

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
RFP Release	1	2018	1	2018
Contract Award	2	2018	2	2018
Test	3	2018	3	2018



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>				<b>Project (Number/Name)</b> EE2 / <i>Stryker Improvement</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>
EE2: <i>Stryker Improvement</i>	-	48.233	43.457	32.975	-	32.975	34.570	13.675	13.916	14.207	0.000	201.033
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

In Fiscal Year (FY) 2021, \$.534 million in Reimbursable Manpower for Program Element (PE) 0203735A Combat Vehicle Improvement Programs Project EE2 Stryker Improvement has been realigned from Reimbursable Civilian Funding to Direct Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments. FY 2021 funding request was reduced by \$14.019 million to account for the availability of prior execution balances.

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

Stryker Improvement will address the development of Lethality, Survivability, Mobility, Network Lethality, and Communication, Command and Control (C3) improvements within the Stryker Family of Vehicles (FoV). Principal development efforts include upgrades associated with the Stryker Double V-Hull (DVH) A1 Engineering Change Proposal (ECP), Stryker 30mm Infantry Carrier Vehicle Dragoon (ICVD) Operational Needs Statement (ONS), Common Remotely Operated Weapon Station-Javelin (CROWS-J) ONS, Stryker Survivability Enhancement, and Stryker Lethality ECPs. DVH A1 ECP power generation, suspension, and network upgrades restores Stryker DVH Space, Weight, and Power-Cooling (SWaP-C) lost as a result of incorporating vehicle changes to counter threats encountered during deployment operations while allowing the future network to be hosted without further degradation in vehicle protection and mobility. The Stryker 30mm ICVD and CROWS-J ONS efforts addressed Urgent Operational Need to increase the firepower of Stryker Infantry Carrier Vehicles (ICV) within the United States Army European Command (USAREUR). The 30mm ICVD ONS effort integrates a 30mm-equipped weapon station providing, USAREUR with precision direct firepower to overwhelm the enemy in encounter actions and suppressive fire to preserve mounted and dismounted freedom of movement. The Stryker Survivability Enhancements addresses evolving threats by assessing survivability improvements, to include passive protection systems, active protection systems, an under-armor fire capability for Stryker-equipped reconnaissance troops, 360 Situational Awareness, reactive armor tiles, and integration of emerging and existing technologies such as the Fire Direction Center requirement, Mobile Command, Integrated Visual Augmentation System (IVAS), Turreted Mortar, and other Stryker based platform solutions. The Stryker Fire Direction Center Variant (FDC) variant will provide an on-the move capability that processes voice and digital data while maintaining contact with the indirect fire team over extended distances. Stryker Lethality ECP (30 mm medium caliber weapon, CROWS-J, Anti-Tank Guided Missile (ATGM), common masted sensor, and other capabilities) efforts focus on the integration of a suite of complementary Mission Equipment Package (MEP) lethality upgrades that will improve the suppressive fire and armored vehicle engagement capabilities across the Army's Stryker Brigade Combat Teams (SBCTs). Additionally, the Lethality MEP upgrades will address existing obsolescence issues of the Remote Weapon Station (RWS) with the CROWS and CROWS-J upgrade and Modified Improved Target Acquisitions System (MITAS) with the improved sights. The ATGM ECP will upgrade the MITAS, incorporating a far target locator and disseminate target acquirement information utilizing network lethality, providing a common operating picture. Upgrade of the Stryker flat-bottom hull and DVH variants to mitigate known system deficiencies. The identified deficiencies include, but are not limited to the Mobile Gun System (MGS) and Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV). Efforts for the Stryker Double V-Hull A1 (DVH A1) Engineering Change Proposal (ECP) (formerly named Stryker ECP 1), Stryker 30mm Infantry Carrier Vehicle Dragoon (ICVD) Operational Needs Statement (ONS) (formerly named Stryker ONS Lethality), Stryker Survivability Enhancements, Stryker Lethality ECPs (formerly referred to as Stryker ECP 2) and Stryker Fire Directional Center Variant (FDC).

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> EE2 / <i>Stryker Improvement</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Stryker DVH A1 ECP Development (Engineering/Prototypes)</p> <p><b>Description:</b> The Stryker DVH A1 ECP is a fleet-wide initiative that mitigates mobility degradation caused by survivability improvements. Addresses vehicle space, weight, power, cooling and computing challenges. Returns the performance of the DVH nearly back to the original design capacity and provides approximately 20% growth potential in gross vehicle weight and power generation capacity posturing these vehicles for efficient upgrades in the future.</p> <p><b>FY 2020 Plans:</b> Continued DVH A1 ECP verification and logistic demonstration, revisions to Stryker Operator and Maintenance Manuals, provisioning of DVH A1 ECP-unique parts, and incorporation of DVH A1 ECP design changes resulting from deficiencies identified during prototype build, development testing, and repair of DVH A1 development test assets.</p> <p><b>FY 2021 Plans:</b> Will complete DVH A1 ECP verification and logistics products.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease due to completion of DVH A1 ECP logistics product development.</p>		1.644	5.587	0.850
<p><b>Title:</b> Stryker DVH A1 ECP Testing</p> <p><b>Description:</b> Government developmental, operational and live fire testing in support of DVH A1 ECP.</p>		0.710	-	-
<p><b>Title:</b> Stryker Lethality ECPs Development (Engineering/Protoypes)</p> <p><b>Description:</b> Lethality ECPs encompasses the integration of a 30 millimeter (mm) medium caliber weapon, under armor Javelin fire capability, improved optics and targeting systems, and other capabilities into the Stryker fleet. These improvements will provide for increased under armor fire capability, target identification range, provide over-match against peer threats and supporting infantry assault, and address obsolescence within the targeting and reconnaissance systems utilized on the Stryker FoV.</p> <p><b>FY 2020 Plans:</b> Continued Stryker Lethality ECPs developmental engineering to include completion of CROWS-J ECP test fixes and logistic products, continuation of ATGM ECP integration, and medium caliber weapon system Bid Sample Assessment.</p> <p><b>FY 2021 Plans:</b> Continuing Stryker Lethality ECPs development to include completion of CROWS-J ECP logistic products, completion of ATGM ECP logistic products, and medium caliber weapon system Bid Sample Assessment</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>		13.230	12.063	7.192

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> EE2 / <i>Stryker Improvement</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Decrease due to the completion of the CROWS-J and ATGM ECPs development efforts.				
<b>Title:</b> Stryker Lethality ECPs Testing <b>Description:</b> Government and Contractor Support for developmental, operational and live fire testing in support of Lethality ECPs. <b>FY 2020 Plans:</b> Continued developmental test, to include safety, performance and environmental test planning and execution activities for the CROWS-J and ATGM ECPs. Begun the medium caliber weapon system Bid Sample Test and Evaluation. <b>FY 2021 Plans:</b> Construction of the medium caliber weapon system Bid Sample test report. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease is due to the completion of the developmental test activities for the CROWS-J and ATGM ECP in FY 2020.		16.300	16.162	0.427
<b>Title:</b> Government Systems Engineering and Project Management <b>Description:</b> Government Systems Engineering and Program Management includes salaries, travel and other support costs required to effectively manage all Research, Development, Test, & Evaluation (RDT&E) efforts. <b>FY 2020 Plans:</b> Continued Government Systems Engineering and Program Management support (labor, travel, training, supplies, and equipment) for Stryker DVH A1 ECP, Survivability Enhancement, and Lethality ECP (CROWS-J ECP, ATGM ECP, medium caliber weapon system) development efforts. Convened a medium caliber weapon system Source Selection and Evaluation Board (SSEB). Fire Direction Center Variant development efforts begun. <b>FY 2021 Plans:</b> Continuing Government Systems Engineering and Program Management support (labor, travel, training, supplies, and equipment) for Stryker DVH A1 ECP, Survivability Enhancement, Lethality ECPs (CROWS-J, ATGM, and 30mm medium caliber weapon system) and Fire Direction Center Variant development efforts. Completion of the medium caliber weapon system Source Selection and Evaluation Board (SSEB). <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease due to completion of the DVH A1 ECP effort.		8.320	5.772	5.587
<b>Title:</b> Wireless Intercom System <b>Description:</b> Develop a performance specification for a common Wireless Intercom System.		5.000	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> EE2 / <i>Stryker Improvement</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Stryker Power System</p> <p><b>Description:</b> Development and testing of a non-primary power solution for the Stryker platform. The non-primary power enhancement incorporates, but not limited to, the battery box container, Auxiliary Power Unit (APU) and interface kits.</p> <p><b>FY 2020 Plans:</b> Continued the development and testing for non-primary power solutions. Begun development of logistics products for the selected solution.</p> <p><b>FY 2021 Plans:</b> Continuation of testing and logistics products development for the non-primary solution.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase in funding due to the increase of development efforts.</p>		3.000	2.200	5.581
<p><b>Title:</b> Stryker Platform Mission Equipment Packages Integration</p> <p><b>Description:</b> Development engineering of Mission Equipment Packages on to the Stryker platforms (Flat-bottom hull, Double V Hull). Integration of the Fire Direction Center MEP on to the DVH A1 platform.</p> <p><b>FY 2021 Plans:</b> Continuation of the development effort for the Fire Direction Center Variant onto a DVH A1 platform. Design engineering efforts will begin with early order material for prototype build.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 is the first year of funding for the development engineering efforts of Stryker Fire Direction Center Variant.</p>		-	-	8.811
<p><b>Title:</b> Stryker Survivability Enhancements</p> <p><b>Description:</b> The Stryker Survivability Enhancements will develop strategies, through technical and engineering analyses, for the integration of emerging technologies onto the Stryker Platforms. The Stryker Survivability Enhancements will include, but are not limited to, the Integrated Visual Augmentation System (IVAS), the fleet wide 360 degree Situational Awareness and the integration of the Stryker Reactive Armor Tiles (SRAT) onto the DVH A1 platform.</p> <p><b>FY 2020 Plans:</b> Integration of emerging technologies such as 360 degree Situational Awareness through Drivers Vision Enhancements (DVE) Wide enhancements, and assessment of the Integrated Visual Augmentation System (IVAS) onto the DVH A1 platform.</p> <p><b>FY 2021 Plans:</b></p>		-	1.673	4.527

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> EE2 / <i>Stryker Improvement</i>
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
Continuation of 360 degree Situational Awareness through DVE Wide enhancements, Stryker Reactive Armor Tiles (SRAT), IVAS efforts, and other emerging technologies onto the DVH A1 platform.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Increase is due to the initiation of the 360 Situational Awareness and SRAT on to the DVH A1 platform.			
<b><i>Title:</i></b> FY2018 NDAA SEC 825 MDAP Cost Overrun <b><i>Description:</i></b> MDAP Cost Overrun Tax	0.029	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	48.233	43.457	32.975

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
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
• GM0100: <i>Stryker (Mod)</i>	127.289	397.687	0.000	-	0.000	-	-	-	-	-	Continuing
• G85200: <i>Stryker Upgrade</i>	265.290	513.858	847.212	-	847.212	903.648	938.202	910.545	906.095	Continuing	Continuing

**Remarks**  
23 March 2018 Army Requirements Oversight Council (AROC) decision to exchange all remaining flat-bottom brigades results in continuing exchange production beginning in FY 2018 funded in Stryker Upgrade (G85200). Stryker MOD (GM0100) supports Stryker Fleet modifications and Lethality ECP retrofits in FY 2019-2025.

Beginning in FY 2021 the requirements and funding in the Stryker MOD (GM0100) will be moved to Stryker Upgrade (G85200).

**D. Acquisition Strategy**  
The Stryker ECP 1 effort will buy back the vehicle space, weight, and power margin lost due to the addition of numerous kits in response to eleven years of war (20-combat rotations & 37+ million total miles), in order to allow integration of the future network (as directed by VCSA in August 2011) without further degrading the performance of the platform. In May 2012, Stryker ECP 1 program (Phase I) was approved, permitting preliminary design and integration efforts on both the Flat Bottom (FB) and DVH variants. In March 2013, Phase II was approved continuing design and integration of ECP 1 mechanical power, electrical power generation, chassis upgrades, and the in-vehicle network upgrades. Based on additional testing conducted in the summer of 2013, the decision was made to focus ECP 1 efforts on the DVH platform and defer efforts on flat-bottom Strykers. The effort has subsequently been renamed the Stryker DVH A1 ECP. The DVH A1 ECP Phase II contract, awarded November 25, 2013, continues development engineering, prototype build test and evaluation. The initial DVH A1 ECP production contract was awarded in October 2016 (Sole-Source Firm Fixed Price arrangement). A second and third buy of DVH A1 ECP vehicles was awarded as a Fixed Price Incentive Fee arrangement. A March 2018 AROC decision to pure fleet the Stryker brigades to DVH with the initial approval for 6 DVH A1 brigades. The objective acquisition strategy is to annually procure 1/2 of a brigade.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> EE2 / <i>Stryker Improvement</i>
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On July 2, 2015, ASARC authorization was granted to execute the Stryker 30mm ICVD ONS effort. 30mm ICVD Engineering, Manufacturing, and Development (EMD) contracts for Non-Recurring Engineering (NRE) and Logistics Products Development/Test Support were awarded in January 2016 and May 2016, respectively (Cost Plus Incentive-Fee basis). The 30mm ICVD ONS Production/Retrofit contract was awarded in May 2016 through an Undefinitized Contract Action (UCA). Definitization of the Fixed Price Incentive Fee (FPIF) Production contract occurred in March 2017.

The Stryker Lethality ECP efforts will focus on the integration of a suite of complementary Mission Equipment Package MEP lethality upgrades 30mm medium caliber weapon system, CROWS-J, common masted sensor, ATGM target acquisition optics, integration of emerging and existing technologies such as the Fire Direction Center requirement, Mobile Command, Integrated Visual Augmentation System (IVAS), Turreted Mortar, and other Stryker based platform solutions, and other capabilities) that will improve the suppressive fire and armored vehicle engagement capabilities across the Army's SBCTs. Army Acquisition Executive (AAE) approval to initiate the Stryker CROWS-J and ATGM ECP efforts was received in a September 30, 2016 Acquisition Decision Memorandum (ADM). A 30mm medium caliber weapon system (MCWS) decision was made in March 2019. The 30mm MCWS effort will award design studies to 5 vendors, evaluate the bid samples requested for production award to determine if there is a vehicle that is ready for production. If the none of the bid samples are production ready, then additional design/development will be required beginning in FY 2021. To improve platform survivability fleet wide, 360 Situational Awareness will be developed by integrating existing technologies, for fleet wide installation over a period of six years to allow the occupants during both open and closed hatch operations to visualize their immediate surrounding while stationary and on the move in adverse weather conditions.

In 2016, the Army approved the FDC requirement and the Field Artillery Battalion TAC using excess Flat Bottom Hull (FBH) Stryker during Force Design Update (FDU) process. Following the March 2018 Pure fleet AROC decision, Force Design Division (FDD) identified the Double V Hull A1 (DVH A1) as the platform for the FDC.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> EE2 / <i>Stryker Improvement</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			
Stryker 30mm ICVD ONS Lethality Project Management	MIPR	PEO GCS/TACOM : Sterling Heights, MI	9.602	-		-		-		-		-	0.000	9.602	-
Survivability Enhancement Government Engineering and Project Management	MIPR	PEO GCS/TACOM : Various	0.534	-		-		-		-		-	0.000	0.534	-
Project Management Office (PMO)	MIPR	PEO GCS/TACOM : Various	31.104	8.291	Jan 2019	5.772	Jan 2020	5.587	Jan 2021	-		5.587	23.488	74.242	-
FY2018 NDAA SEC 825 MDAP Cost Overrun	Allot	ASAALT : Huntsville, Alabama	-	0.029		-		-		-		-	0.000	0.029	-
<b>Subtotal</b>			41.240	8.320		5.772		5.587		-		5.587	23.488	84.407	N/A

<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			
Stryker DVH A1 ECP Development	SS/CPIF	GDLS, MI : Various	172.955	1.673	Dec 2018	5.587	Jan 2020	0.850	Jan 2021	-		0.850	0.000	181.065	-
Stryker DVH A1 ECP Training Device Updates	MIPR	PEO STRI, FL : Various	0.250	-		-		-		-		-	0.000	0.250	-
Stryker 30mm ICVD ONS Development	SS/CPIF	GDLS, MI : Various	79.895	-		-		-		-		-	0.000	79.895	-
Stryker Lethality ECPs Development	C/Various	PM CSW; PM CCWS : Various	36.383	13.230	Jan 2019	12.063	Jan 2020	7.192	Jan 2021	-		7.192	20.917	89.785	-
Stryker Lethality ECPs Training Device Updates	MIPR	PEO STRI, FL : Various	0.125	-		-		-		-		-	0.000	0.125	-
Stryker Survivability Enhancement	Various	US Army TARDEC, Various : Sterling Heights, MI	16.169	-		1.673	Jan 2020	3.730	Jan 2021	-		3.730	4.215	25.787	-
Stryker Power System Development	MIPR	US Army TARDEC, Various : US Army TARDEC	-	1.900	Feb 2019	2.200	Feb 2020	1.200		-		1.200	0.000	5.300	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> EE2 / <i>Stryker Improvement</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			
Stryker Wireless Intercom Development	C/CPFF	Ricardo Defense : Washington DC	-	2.500	Apr 2019	-		-		-		-	0.000	2.500	-
Stryker Fire Direction Center Variant Development	TBD	TBD : TBD	-	-		-		8.811	Jan 2021	-		8.811	14.815	23.626	-
<b>Subtotal</b>			305.777	19.303		21.523		21.783		-		21.783	39.947	408.333	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			
Stryker DVH A1 ECP Testing	MIPR	Army Test Centers : Various	45.259	0.710	Dec 2018	-		-		-		-	0.000	45.969	-
Stryker DVH A1 ECP Contractor Support to Test	SS/CPFF	GDLS, MI : Various	39.258	-		-		-		-		-	0.000	39.258	-
Stryker 30mm ICVD ONS Test	MIPR	Army Test Centers : Various	21.324	-		-		-		-		-	0.000	21.324	-
Stryker 30mm ICVD ONS Contractor Support to Test	SS/CPFF	GDLS, MI : Various	26.724	-		-		-		-		-	0.000	26.724	-
Stryker Lethality ECPs Testing	MIPR	Army Test Centers : Various	5.096	16.300	Dec 2018	16.162	Jan 2020	0.427	Dec 2020	-		0.427	0.000	37.985	-
Stryker Lethality ECPs Contractor Support to Test	MIPR	Various : Various	0.698	-		-		-		-		-	0.000	0.698	-
Stryker Survivability Enhancement	MIPR	Army Test Centers : Various	5.845	-		-		0.797	Dec 2020	-		0.797	0.000	6.642	-
Stryker Power System Testing	MIPR	Army Test Centers : Various	-	1.100	Feb 2019	-		4.381	Dec 2020	-		4.381	0.825	6.306	-
Stryker Wireless Intercom Testing	MIPR	Army Test Centers : Various	-	2.500	Jun 2019	-		-		-		-	0.000	2.500	-
<b>Subtotal</b>			144.204	20.610		16.162		5.605		-		5.605	0.825	187.406	N/A



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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>							<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 2040 / 7			<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>				<b>Project (Number/Name)</b> EE2 / <i>Stryker Improvement</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>	491.221	48.233		43.457		32.975	-	32.975	64.260	680.146	N/A

Remarks

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> EE2 / <i>Stryker Improvement</i>

Event Name	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
Stryker DVH A1 ECP (Phase II)	[Redacted]				[Redacted]																							
	DVH A1 ECP Design/Prototype/Logistics Products																											
Stryker DVH A1 ECP Production (Phase III)	[Redacted]																											
	DVH A1 ECP Production																											
Stryker CROWS-J ECP Design/Prototype/Logistic Products	[Redacted]				[Redacted]																							
	CROWS-J ECP Design/Prototype/Logistics Products																											
Stryker CROWS-J ECP Safety/Software/Performance Test	[Redacted]				[Redacted]																							
	CROWS-J ECP Safety/Software/Performance Test																											
Stryker CROWS-J ECP Production/Retrofit	[Redacted]																											
	CROWS-J ECP Production/Retrofit																											
Stryker CROWS-J ECP First Unit Equipped (FUE)													3															
													CROWS-J ECP FUE															
Stryker ATGM ECP Design/Prototype/Logistics Products	[Redacted]				[Redacted]																							
	ATGM ECP Design/Prototype/Logistics Products																											
Stryker ATGM ECP Safety/Perf./Elec. Test	[Redacted]				[Redacted]																							
	ATGM ECP Safety/Performance/Electronics Test																											
Stryker ATGM ECP Production/Retrofit									[Redacted]				[Redacted]															
									ATGM ECP Production/Retrofit																			
Stryker ATGM ECP First Unit Equipped (FUE)													2															
													ATGM ECP FUE															
Stryker Medium Caliber Production Decision													1															
													Medium Caliber Weapon Production Decision															
Stryker Medium Caliber Weapon Gun Production					[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
					Medium Caliber Weapon Gun Production																							
Stryker Medium Caliber Weapon Mission Equipment Package (MEP) Production									[Redacted]				[Redacted]				[Redacted]				[Redacted]							
									Medium Caliber Weapon Mission Equipment Package (MEP) Production																			

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> EE2 / <i>Stryker Improvement</i>

Event Name	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
Stryker Medium Caliber Weapon Safety/Perf./Live Fire/Electronics Testing																												
Stryker Medium Caliber Weapon First Unit Equipped (FUE)																												
Stryker Medium Caliber Weapon Design/Prototype/Logistic Products																												
Stryker Medium Caliber Weapon Trade Study/Cost Benefit Analysis/SSEB																												
Stryker Wireless Intercom System																												
Stryker Power System																												
Stryker Fire Direction Center Variant (FDC) Design/Prototype/Logistics Products																												
SRAT DVH A1 Development																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	<b>Project (Number/Name)</b> EE2 / <i>Stryker Improvement</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Stryker DVH A1 ECP (Phase II)	1	2014	2	2020
Stryker DVH A1 ECP Production (Phase III)	1	2017	4	2030
Stryker CROWS-J ECP Design/Prototype/Logistic Products	1	2019	4	2021
Stryker CROWS-J ECP Safety/Software/Performance Test	1	2019	2	2021
Stryker CROWS-J ECP Production/Retroft	3	2019	4	2029
Stryker CROWS-J ECP First Unit Equipped (FUE)	4	2021	4	2021
Stryker ATGM ECP Design/Prototype/Logistics Products	1	2018	3	2021
Stryker ATGM ECP Safety/Perf./Elec. Test	4	2019	2	2021
Stryker ATGM ECP Production/Retrofit	1	2021	4	2023
Stryker ATGM ECP First Unit Equipped (FUE)	2	2021	2	2021
Stryker Medium Caliber Production Decision	2	2021	2	2021
Stryker Medium Caliber Weapon Gun Production	3	2020	4	2025
Stryker Medium Caliber Weapon Mission Equipment Package (MEP) Production	2	2021	4	2025
Stryker Medium Caliber Weapon Safety/Perf./Live Fire/Electronics Testing	2	2022	4	2023
Stryker Medium Caliber Weapon First Unit Equipped (FUE)	4	2022	4	2022
Stryker Medium Caliber Weapon Design/Prototype/Logistic Products	2	2019	1	2025
Stryker Medium Caliber Weapon Trade Study/Cost Benefit Analysis/SSEB	3	2020	2	2021
Stryker Wireless Intercom System	3	2019	4	2019
Stryker Power System	2	2019	4	2021
Stryker Fire Direction Center Variant (FDC) Design/Prototype/Logistics Products	1	2020	1	2030
SRAT DVH A1 Development	2	2021	4	2022

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0203743A / <i>155mm Self-Propelled Howitzer 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	-	35.681	199.274	427.254	-	427.254	301.244	87.210	33.657	33.997	0.000	1,118.317
FF9: <i>PIM Improvement Program</i>	-	35.681	199.274	427.254	-	427.254	301.244	87.210	33.657	33.997	0.000	1,118.317

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

The current Paladin Integrated Management (PIM) is an Acquisition Category (ACAT) 1C Acquisition program which consists of the Self Propelled Howitzer (SPH) and the Carrier Ammunition Tracked (CAT). The PIM Improvement Program is intended to address the current Howitzer capability gap based on a capability needs assessment performed by the user community to restore indirect fires support overmatch to the United States Army. This effort will evaluate developing technologies to determine which configuration will add optimal value to the Army. This effort will consist of multiple increments to spiral technology as it matures and may include, but is not limited to mobility, survivability, reliability, supportability, and lethality upgrades such as the Extended Range Cannon Artillery (ERCA) modernization effort to integrate a new cannon, gun mount, gun drive systems, fire control systems, autoloader, and optionally-manned capability into a Howitzer platform. Analysis will be required to evaluate the impact of the new cannon technology and modifications required to support ammunition automation, remote firing, and remote movement on the vehicle chassis, cab, suspension, mobility, and electronic architecture. This effort will develop, evaluate, build, and test prototypes.

<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	37.155	214.246	393.712	-	393.712
Current President's Budget	35.681	199.274	427.254	-	427.254
Total Adjustments	-1.474	-14.972	33.542	-	33.542
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-14.972			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.474	-			
• Adjustments to Budget Years	-	-	33.542	-	33.542

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203743A / 155mm Self-Propelled Howitzer Improvements				<b>Project (Number/Name)</b> FF9 / PIM Improvement Program			
<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>
FF9: PIM Improvement Program	-	35.681	199.274	427.254	-	427.254	301.244	87.210	33.657	33.997	0.000	1,118.317
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The current Paladin Integrated Management (PIM) is an Acquisition Category (ACAT) 1C Acquisition program which consists of the Self Propelled Howitzer (SPH) and the Carrier Ammunition Tracked (CAT). The PIM Improvement Program is intended to address the current Howitzer capability gap based on a capability needs assessment performed by the user community to restore indirect fires support overmatch to the United States Army. This effort will evaluate developing technologies to determine which configuration will add optimal value to the Army. This effort will consist of multiple increments to spiral technology as it matures and may include, but is not limited to mobility, survivability, reliability, supportability, and lethality upgrades such as the Extended Range Cannon Artillery (ERCA) modernization effort to integrate a new cannon, gun mount, gun drive systems, fire control systems, autoloader, and optionally-manned capability into a Howitzer platform. Analysis will be required to evaluate the impact of the new cannon technology and modifications required to support ammunition automation, remote firing, and remote movement on the vehicle chassis, cab, suspension, mobility, and electronic architecture. This effort will develop, evaluate, build, and test prototypes.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> ERCA INC 1 - Product Development	31.220	162.050	129.834
<b>Description:</b> ERCA INC 1C improves lethality through increased range to the SPH. Funds support the ERCA INC 1C developmental engineering costs and build the ERCA INC 1C prototypes.			
<b>FY 2020 Plans:</b> Will purchase long lead materials for the ERCA prototypes to be integrated onto the M109A7 platform. Use Army Combat Capabilities Development Command Armaments Center (ARDEC) Other Transaction Agreement (OTAs) to bring non traditional contractors to burn down risk. System Level Critical Design Review (CDR) in 2nd Quarter (2Q) Fiscal Year (FY) 2020.			
<b>FY 2021 Plans:</b> Conduct developmental engineering efforts, conduct vehicle integration design, build ERCA INC 1C prototypes, support testing, and develop level 3 Thermal Design Power (TDP).			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease from FY 2020 to FY 2021 is due to ERCA INC 1C and ERCA INC 2 detailed breakout in the R Forms.			
<b>Title:</b> ERCA INC 2 - Product Development	-	-	219.784
<b>Description:</b> ERCA INC 2 improves lethality through increased rate of fire. Funds support the ERCA INC 2 development engineering costs to include building the ERCA INC 2 prototypes.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203743A / 155mm Self-Propelled Howitzer Improvements	<b>Project (Number/Name)</b> FF9 / PIM Improvement Program		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>FY 2021 Plans:</b> Design and integrate autoloader and cab configurations. Conduct system level integration and engineering efforts to upgrade and design mobility, survivability, reliability and lethality upgrades. As necessary, procure long lead material for ERCA INC 2 prototypes.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase from FY 2020 to FY 2021 is due to ERCA INC 1C and ERCA INC 2 detailed breakout in the R Forms.</p>				
<p><b>Title:</b> Program Management</p> <p><b>Description:</b> Funding is provided for all Program Management efforts on the Extended Range Cannon Artillery effort.</p> <p><b>FY 2020 Plans:</b> Continue the development for all required documents, office staff and engineering Integrated Product Team (IPT) development. Use CCDC-AC OTAs to reduce risk.</p> <p><b>FY 2021 Plans:</b> Continue the development and production for all required documents, office staff and engineering IPT development. Use non traditional contractors OTAs to reduce risk.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase from FY 2020 to FY 2021 is due to ramp up on ERCA INC 1C and ERCA INC 2 development.</p>		3.701	3.896	7.070
<p><b>Title:</b> Test and Evaluation</p> <p><b>Description:</b> This funding supports all Testing and Evaluation on all increments on the Extended Range Cannon Artillery effort.</p> <p><b>FY 2020 Plans:</b> Government Test support to include all test execution, data collection and logistic support. To include tests of Mobility, Reliability and Test Firings. Use CCDC-AC OTAs to reduce risk. TDP Development through 3Q FY 2020.</p> <p><b>FY 2021 Plans:</b> Conduct Developmental Testing and ammunition qualification. These events include all test execution, data collection, contractor and logistic support for mobility, reliability and firings tests.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase from FY 2020 to FY 2021 is due to the beginning of ERCA INC 1C developmental testing efforts and ammunition qualifications.</p>		0.760	33.328	70.566
<b>Accomplishments/Planned Programs Subtotals</b>		35.681	199.274	427.254

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203743A / 155mm Self-Propelled Howitzer Improvements	<b>Project (Number/Name)</b> FF9 / PIM Improvement Program

**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>
• GA0400: M109 FOV Modifications	26.482	25.756	26.893	-	26.893	80.337	122.886	158.750	253.849	0.000	694.953

**Remarks**

**D. Acquisition Strategy**

Program Manager (PM) Self-Propelled Howitzer Systems (SPHS) will use the approved National Defense Authorization Act (NDAA) Section 804 middle tier acquisition program and subsequent NDAA Section 804 middle tier acquisition programs for development, rapid prototyping, rapid fielding, integration, test, and sustainment actions as the program moves forward and transitions to a program of record to field the ERCA system.



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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0203743A / 155mm Self-Propelled Howitzer Improvements				Project (Number/Name) FF9 / PIM Improvement 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
PIM Improvement Program	MIPR	Various - OGAs : PEO	22.161	-		-		-		-		-	Continuing	Continuing	Continuing
ERCA INC 1C - Developmental Eng	Various	Various : Various Locations	14.344	21.878	Jan 2019	86.040	Jan 2020	77.715	Jan 2021	-		77.715	Continuing	Continuing	Continuing
ERCA INC 1C - Prototype Build	Various	Various : Various Locations	-	9.342	Jan 2019	-		52.119	Jan 2021	-		52.119	Continuing	Continuing	Continuing
ERCA INC 2 - Developmental Eng	Various	Various : Various Locations	-	-		76.010	Feb 2020	143.712	Feb 2021	-		143.712	Continuing	Continuing	Continuing
ERCA INC 2 - Prototype Build	Various	Various : Various Locations	-	-		-		76.072	Oct 2020	-		76.072	Continuing	Continuing	Continuing
<b>Subtotal</b>			36.505	31.220		162.050		349.618		-		349.618	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
PMO/PEO Support	MIPR	PM/PEO PIM : Various	2.649	3.701	Dec 2018	3.896	Dec 2019	7.070	Oct 2020	-		7.070	Continuing	Continuing	Continuing
<b>Subtotal</b>			2.649	3.701		3.896		7.070		-		7.070	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	MIPR	Various - OGAs : Various	-	0.760	Dec 2018	33.328	Apr 2020	70.566	Oct 2020	-		70.566	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	0.760		33.328		70.566		-		70.566	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			39.154	35.681		199.274		427.254		-		427.254	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>							<b>Date: February 2020</b>			
<b>Appropriation/Budget Activity</b> 2040 / 7			<b>R-1 Program Element (Number/Name)</b> PE 0203743A / 155mm Self-Propelled Howitzer Improvements			<b>Project (Number/Name)</b> FF9 / PIM Improvement Program				
	<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-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203743A / 155mm Self-Propelled Howitzer Improvements	<b>Project (Number/Name)</b> FF9 / PIM Improvement Program

Event Name	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				
INC 1 Developmental Engineering																																
INC 1 Dev Eng																																
INC 1 Integration OTA Award																																
INC 1 OTA Award	1																															
INC 1 Prototype Manufacturing																																
INC 1 Prototypes																																
INC 1 Developmental Testing and Operational Assesment																																
INC 1 DT/OA																																
INC 2 Developmental Engineering																																
INC 2 Dev Eng																																
INC 2 Integration OTA Awards																																
OTA Awards	2																															
INC 2 Prototype Manufacturing																																
INC 2 Prototypes																																
INC 2 Developmental Testing and Operational Assesment																																
INC 2 DT/OA																																

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203743A / 155mm Self-Propelled Howitzer Improvements	<b>Project (Number/Name)</b> FF9 / PIM Improvement Program

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
INC 1 Developmental Engineering	2	2018	3	2023
INC 1 Integration OTA Award	4	2019	4	2019
INC 1 Prototype Manufacturing	4	2018	3	2023
INC 1 Developmental Testing and Operational Assesment	1	2019	4	2024
INC 2 Developmental Engineering	2	2020	2	2025
INC 2 Integration OTA Awards	4	2020	4	2020
INC 2 Prototype Manufacturing	1	2021	3	2023
INC 2 Developmental Testing and Operational Assesment	1	2021	2	2025

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0203744A / Aircraft Modifications/Product Improvement Programs
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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	-	13.629	9.278	11.688	-	11.688	0.000	0.000	0.000	0.000	Continuing	Continuing
EB6: MQ-1C Gray Eagle MODS	-	13.629	9.278	11.688	-	11.688	0.000	0.000	0.000	0.000	Continuing	Continuing

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

The MQ-1C Gray Eagle provides the Army with an extended range, multi-purpose (ERMP) Unmanned Aircraft System (UAS); capable of executing reconnaissance, security, attack, and intelligence collection missions in the range of military operations (ROMO). Sensors/payloads include an Electro-Optical/Infrared/Laser Designator (EO/IR/LD), Synthetic Aperture Radar/Moving Target Indicator (SAR/MTI), Signals Intelligence (SIGINT), and HELLFIRE missiles; providing a near all-weather mission capability. MQ-1C Gray Eagle is a dedicated, assured, multi-mission UAS fielded to all Army Divisions, Intelligence and Security Command and Army Special Operations Command in support of the commander's warfighting priorities within multi-domain battle operations.

The Fiscal Year (FY) 2021 Aircraft Modification/Product Improvement funding of \$11.7 million will both greatly enhance propulsion reliability and mitigate obsolescence. The current MQ-1C Gray Eagle engines can no longer be procured. Additionally, this propulsion reliability effort will reduce MQ-1C Gray Eagle Return to Base events and decrease the likelihood of engine related aircraft mishaps. This modernization effort will increase operational readiness and posture Gray Eagle to support multi-domain.

<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	17.684	16.486	13.904	-	13.904
Current President's Budget	13.629	9.278	11.688	-	11.688
Total Adjustments	-4.055	-7.208	-2.216	-	-2.216
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-7.208			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-3.407	-			
• SBIR/STTR Transfer	-0.648	-			
• Adjustments to Budget Years	-	-	-2.216	-	-2.216

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203744A / Aircraft Modifications/ Product Improvement Programs					<b>Project (Number/Name)</b> EB6 / MQ-1C Gray Eagle MODS			
<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>	
EB6: MQ-1C Gray Eagle MODS	-	13.629	9.278	11.688	-	11.688	0.000	0.000	0.000	0.000	Continuing	Continuing	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

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

The MQ-1C Gray Eagle provides the Army with an extended range, multi-purpose (ERMP) Unmanned Aircraft System (UAS); capable of executing reconnaissance, security, attack, and intelligence collection missions in the range of military operations (ROMO). Sensors/payloads include an Electro-Optical/Infrared/Laser Designator (EO/IR/LD), Synthetic Aperture Radar/Moving Target Indicator (SAR/MTI), Signals Intelligence (SIGINT), and HELLFIRE missiles; providing a near all-weather mission capability. MQ-1C Gray Eagle is a dedicated, assured, multi-mission UAS fielded to all Army Divisions, Intelligence and Security Command and Army Special Operations Command in support of the commander's warfighting priorities within multi-domain battle operations.

The Fiscal Year (FY) 2021 Aircraft Modification/Product Improvement funding of \$11.7 million will improve propulsion reliability. The propulsion reliability effort will reduce MQ-1C Gray Eagle Return to Base events and decrease the likelihood of engine related aircraft mishaps. Additionally, this effort will increase operational readiness for the Operational Commander.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Global Positioning System (GPS) Denied <b>Description:</b> GPS Denied  <b>FY 2020 Plans:</b> Funding continued support to system processor re-architecture, as well as development of an alternate navigation technology that enables operations during periods of GPS outage using terrestrial and/or celestial data to include engineering support activities. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Efforts completed.	3.803	0.992	-
<b>Title:</b> Alternate Munitions Integration <b>Description:</b> Alternate Munitions Integration  <b>FY 2020 Plans:</b> Funding continues Universal Armament Interface/Universal Payload Interface development. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Efforts completed	0.482	0.656	-
<b>Title:</b> Ground Base Sense and Avoid (GBSAA) Block II	6.344	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203744A / Aircraft Modifications/ Product Improvement Programs	<b>Project (Number/Name)</b> EB6 / MQ-1C Gray Eagle MODS

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Description:</b> GBSAA Block II			
<b>Title:</b> Survivability <b>FY 2020 Plans:</b> Funding continued development of system processor modules that support current and future Survivability enhancements, datalinks modernization, and modular open-system architecture requirements. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Efforts completed	-	0.730	-
<b>Title:</b> Propulsion Reliability <b>Description:</b> Propulsion Reliability <b>FY 2020 Plans:</b> Funding provided development , testing, and qualification of various propulsion reliability improvements aimed at reducing Return to Base events and decreasing propulsion related aircraft mishaps. <b>FY 2021 Plans:</b> This funding supports engine development efforts and qualification testing to mitigate engine obsolescence and to increase operational readiness. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Supports increased testing requirements.	-	6.900	11.688
<b>Title:</b> Reprogramming action	3.000	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	13.629	9.278	11.688

<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>
• A00005: MQ-1 UAV	103.326	144.000	0.000	-	0.000	-	-	-	-	0.000	247.326
• AA6601: Gray Eagle Mods2	189.781	14.699	16.280	-	16.280	10.365	8.580	8.674	-	0.000	248.379

**Remarks**

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203744A / Aircraft Modifications/ Product Improvement Programs	<b>Project (Number/Name)</b> EB6 / MQ-1C Gray Eagle MODS

**D. Acquisition Strategy**

An ERMP Operational Requirement Document (ORD) was approved by the Joint Requirement Oversight Council (JROC) 6 Apr 2005. Milestone B occurred on 20 Apr 2005, and the System Development and Demonstration contract was awarded 8 Aug 2005, as a result of a competitive solicitation which included a vendor system capabilities demonstration. A Capabilities Production Document (CPD) was approved 14 Mar 2009. MQ-1C Gray Eagle completed Follow-On Test and Evaluation (FOTE) on 12 Jun 2015.

This RDTE element funds a propulsion reliability improvement with the development of the Heavy Fuel Engine (HFE) 2.0 engine system. The current MQ-1C aircraft engine has experienced material failures that have resulted in aircraft mishaps (loss of aircraft) and a high number lost flight hours due to Return to Base (RTB) events. HFE 2.0 implements aviation grade components and focused reliability improvements that will address previous material failures and RTB drivers. Additionally, the Army was notified by the original equipment manufacturer (OEM) that the current engine core is obsolete and the current manufacture will no longer supply the engine core. HFE 2.0 also resolves this obsolescence/supply issue. In 2018, the Army issued an RFI to industry to assess the state of engine technology and availability of a COTS/ NDI engine solution that could meet MQ-1C capability needs and requirements. The primary goal of the RFI was to establish an alternative engine for MQ-1C that is reliable and could be integrated and qualified in a two year timeframe to resolve critical reliability and supply issues with the current engine. Upon completion of the RFI evaluations, an industry day event was held with all vendors to answer questions and gain additional information from each potential vendor in key areas such as reliability, cost and schedule. As a result of the Army's RFI and Industry day event, it was determined that the HFE 2.0 was the only engine to meet requirements for an alternative MQ-1C engine. Funded RDTE elements will support completion of integration, test, and qualification of the HFE 2.0 engine system on the MQ-1C aircraft. This effort will secure engine supply and result in greater propulsion system reliability and increased operational readiness to the commander in the field. Funds are planned for award on the Gray Eagle Technical Services contract as a Technical Services Memorandum (TSM) task order, and as a Military Interdepartmental Purchase Requisitions (MIPRs) to various other Government agencies. Upon completion of qualification, HFE 2.0 engine systems will be procured under the PBL contract and fielded through attrition.



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203744A / Aircraft Modifications/ Product Improvement Programs	<b>Project (Number/Name)</b> EB6 / MQ-1C Gray Eagle MODS
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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			
FY2019 Reprogramming Action	TBD	PEO M&S : Redstone Arsenal	-	3.000	Jul 2019	-		-		-		-	0.000	3.000	-
<b>Subtotal</b>			-	3.000		-		-		-		-	0.000	3.000	N/A

<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			
Global Positioning System (GPS) Denied	SS/CPFF	General Atomics/ ASI : San Diego, CA	6.658	3.803	Mar 2019	0.992	Jan 2020	-		-		-	Continuing	Continuing	-
Universal Ground Control Station (UGCS) Improvements	SS/CPFF	General Atomics/ ASI : San Diego, CA	15.279	-		-		-		-		-	0.000	15.279	-
Alternate Munitions Integration	SS/CPFF	General Atomics- ASI : Poway, CA	18.606	0.482	Mar 2019	0.656	Jan 2020	-		-		-	0.000	19.744	-
Ground Base Sense and Avoid Block II	SS/CPFF	Various : Various	19.018	6.344	Oct 2018	-		-		-		-	0.000	25.362	-
Survivability	MIPR	Various : Various	0.148	-		0.730	Nov 2019	-		-		-	Continuing	Continuing	-
Propulsion Reliability	SS/CPFF	General Atomics/ ASI : San Diego, CA	-	-		6.900	Mar 2020	9.200	Mar 2021	-		9.200	Continuing	Continuing	-
<b>Subtotal</b>			59.709	10.629		9.278		9.200		-		9.200	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			
Engineering Support - GBSAA	MIPR	Various : Various	2.163	-		-		-		-		-	0.000	2.163	-
<b>Subtotal</b>			2.163	-		-		-		-		-	0.000	2.163	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203744A / Aircraft Modifications/ Product Improvement Programs	<b>Project (Number/Name)</b> EB6 / MQ-1C Gray Eagle MODS

Event Name	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
Alternate Munitions Integration	[Redacted]				[Redacted]																							
Global Positioning System Denied	[Redacted]				[Redacted]																							
Engineering and Software Development - MQ-1 Gray Eagle	[Redacted]				[Redacted]																							
Engineering and Software Development - GBSAA	[Redacted]				[Redacted]																							
Training Development and Software/System Testing - MQ-1 Gray Eagle	[Redacted]				[Redacted]																							
Training Development and Software/System Testing- GBSAA	[Redacted]				[Redacted]																							
Materiel Release - GBSAA	[Redacted]				[Redacted]																							
Survivability	[Redacted]				[Redacted]																							
First Unit Equipped - GBSAA	[Redacted]				[Redacted]																							
Propulsion Reliability	[Redacted]				[Redacted]																							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203744A / Aircraft Modifications/ Product Improvement Programs	<b>Project (Number/Name)</b> EB6 / MQ-1C Gray Eagle MODS

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Engineering and Manufacturing Development - GBSAA	4	2017	2	2018
Alternate Munitions Integration	2	2017	4	2020
Universal Ground Control Station Improvements	2	2017	4	2018
Global Positioning System Denied	2	2017	4	2020
Engineering and Software Development - MQ-1 Gray Eagle	2	2017	4	2020
Engineering and Software Development - GBSAA	1	2018	1	2019
Training Development and Software/System Testing - MQ-1 Gray Eagle	3	2017	4	2020
Critical Design Review - GBSAA	3	2018	3	2018
Training Development and Software/System Testing- GBSAA	4	2018	4	2019
Materiel Release - GBSAA	4	2018	4	2019
Survivability	2	2018	4	2020
First Unit Equipped - GBSAA	4	2019	4	2019
Propulsion Reliability	2	2020	4	2021

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0203752A / <i>Aircraft Engine Component Improvement 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	-	0.146	0.144	0.080	-	0.080	0.145	0.145	0.145	0.145	0.000	0.950
106: <i>A/C Compon Improv Prog</i>	-	0.146	0.144	0.080	-	0.080	0.145	0.145	0.145	0.145	0.000	0.950

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

Aircraft Engine Component Improvement Program (CIP) develops, tests, and qualifies improvements to aircraft engine components to correct service-revealed deficiencies, improve flight safety, enhance readiness and reduce operating and support (O&S) costs. In addition, CIP provides the test vehicles for the testing and qualification efforts required as a part of the Army's Critical Safety Item (CSI) program. Non-program specific Auxiliary Power Unit (APU) as well as Unmanned Aerial Vehicle (UAV) safety and readiness issues are also addressed under this Program Element.

<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	0.146	0.144	0.145	-	0.145
Current President's Budget	0.146	0.144	0.080	-	0.080
Total Adjustments	0.000	0.000	-0.065	-	-0.065
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.065	-	-0.065

**Change Summary Explanation**

Fiscal Year (FY) 2021 decrement of \$0.065 million realigned to support higher priority modernization efforts.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203752A / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 106 / A/C Compon Improv Prog
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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
106: A/C Compon Improv Prog	-	0.146	0.144	0.080	-	0.080	0.145	0.145	0.145	0.145	0.000	0.950
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Aircraft Engine Component Improvement Program (CIP) develops, tests, and qualifies improvements to aircraft engine components to correct service-revealed deficiencies, improve flight safety, enhance readiness and reduce operating and support (O&S) costs. In addition, CIP provides the test vehicles for the testing and qualification efforts required as a part of the Army's Critical Safety Item (CSI) program. Non-program specific Auxiliary Power Unit (APU) as well as Unmanned Aerial Vehicle (UAV) safety and readiness issues are also addressed under this Program Element (PE).

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

	FY 2019	FY 2020	FY 2021
<p><b>Title:</b> Gray Eagle UAS Turbocharger Compressor Blow-off Valve</p> <p><b>Description:</b> UAV Gray Eagle turbocharger investigation at the United States (US) Army Vehicle Technology Directorate (VTD) at Army Research Laboratory (ARL) Aberdeen Proving Grounds. Provide research to support airworthiness, reliability and performance improvements of the UAV Gray Eagle Turbocharger. Investigate and research the technology challenges of incorporating a turbocharger compressor blow-off valve. The current wastegate configuration was found to be highly sensitive at altitude, resulting in combustion instability. Analysis has been reviewed showing that turbochargers configured with compressor blow-off valves are more reliable and robust than the currently used wastegate configuration.</p> <p><b>FY 2020 Plans:</b> Continued to research improvements to address service related deficiencies to improve safety and reduce O&amp;S Costs.</p> <p><b>FY 2021 Plans:</b> Will research improvements to address service related deficiencies to improve safety and reduce O&amp;S Costs.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Fiscal Year (FY) 2021 decrease a result of internal project funding realignment.</p>	-	0.084	0.037
<p><b>Title:</b> In-House Support</p> <p><b>Description:</b> In-house support for the CIP engineers. Contracting support for CIP contracts.</p> <p><b>FY 2020 Plans:</b> Continued to provide in-house engineering support for UAV engine CIP programs.</p> <p><b>FY 2021 Plans:</b></p>	0.070	0.060	0.005

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203752A / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 106 / A/C Compon Improv Prog		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Will continue to provide in-house engineering support for UAV engine CIP programs.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 decrease realigned to higher priority Army modernization efforts.				
<b>Title:</b> Hunter UAS Fuel Injector Evaluation		0.033	-	-
<b>Description:</b> UAV Hunter fuel injector investigation at the US Army VTD at ARL Aberdeen Proving Grounds. Provide research to support airworthiness, reliability and performance improvements of the Hunter UAV fuel injectors to determine root cause for clogged injection orifices which result in dropped engine speed at aircraft take-off power. The intent of this program is to improve aircraft readiness and reliability by mitigating the root cause of the fuel injector clogging.				
<b>Title:</b> Hunter UAS Turbocharger Life Management		0.023	-	0.038
<b>Description:</b> UAV Hunter fuel injector investigation at the US Army VTD at ARL Aberdeen Proving Grounds. Instrument the Hunter turbochargers and exhaust manifolds, and provide support for in-flight testing to acquire data for turbocharger lifing analysis to support of airworthiness, readiness, reliability, and safety of the Hunter aircraft. UAV Hunter turbocharger investigation at the U.S. ARL VTD at Aberdeen Proving Ground, MD. Also provides research to support airworthiness, reliability and performance improvements of Hunter UAV turbocharger. An alternate turbocharger is required to support airworthiness, reliability and performance of Hunter UAS engine. The Hunter UAS has experienced ?Soft Rotation? due to the aircraft?s inability to achieve an engine speed sufficient for take-off (i.e. insufficient thrust). The increased frequency in soft rotations during take-off increases the risk of potential damage to equipment or injury to personnel due to the potential for the aircraft to depart the runway after rotation rather than taking flight. Testing has demonstrated that the current turbocharger is operating very close to the surge limit. The engine calibration limits turbocharger speed. However, there is no potential for an increase in performance with the currently installed turbocharger.				
<b>FY 2021 Plans:</b> Will research improvements to address service related deficiencies to improve safety and reduce O&S Costs.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 increase a result of internal project funding realignment.				
<b>Title:</b> Hunter UAS Lower Propeller Shafts		0.020	-	-
<b>Description:</b> UAV Hunter lower propeller shaft investigation at the US Army Redstone Test Center (RTC) at Redstone Arsenal. Perform an engineering investigation of the Hunter UAS lower propeller shaft, PN: 886020-2, to verify the proposed configuration provides for a more reliable and durable installation than the currently fielded configuration.				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203752A / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 106 / A/C Compon Improv Prog

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Accomplishments/Planned Programs Subtotals</b>	0.146	0.144	0.080

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

N/A

**Remarks**

**D. Acquisition Strategy**

Improved designs will be implemented via Engineering Change Proposal (ECP) and follow-on procurement or modification to a production contract to introduce the improved hardware.



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203752A / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 106 / A/C Compon Improv Prog
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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			
In-house Engineering	Allot	US Army AMRDEC : Redstone Arsenal, AL	2.950	0.070	Oct 2018	0.060	Oct 2019	0.005	Oct 2020	-		0.005	Continuing	Continuing	Continuing
<b>Subtotal</b>			2.950	0.070		0.060		0.005		-		0.005	Continuing	Continuing	N/A

<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			
T700 Engine	SS/IDIQ	GE-Air : Lynn, MA	61.729	-		-		-		-		-	Continuing	Continuing	Continuing
T55 Engine	SS/IDIQ	Honeywell : Phoenix, AZ	30.161	-		-		-		-		-	Continuing	Continuing	Continuing
T62 Auxiliary Power Unit (APU)	C/IDIQ	Redstone Technical Center Redstone Arsenal, AL : ATEC	0.050	-		-		-		-		-	Continuing	Continuing	Continuing
APU's	SS/IDIQ	Air Force : Kelly AFB, TX	13.647	-		-		-		-		-	Continuing	Continuing	Continuing
Gray Eagle UAS Turbocrahger Compressor Blow-Off Valve	Various	ARL-Vehicle Technology Directorate : TBD	1.012	-		0.084	Sep 2020	0.037	Sep 2021	-		0.037	Continuing	Continuing	Continuing
APU's	SS/IDIQ	Air Force : Hill AFB, UT	2.319	-		-		-		-		-	Continuing	Continuing	Continuing
T-62T-2B Vibration Test	Various	Redstone Technical Text Center : Redstone Arsenal, AL	0.050	-		-		-		-		-	Continuing	Continuing	-
Hunter UAS Fuel Injector Evaluation	TBD	To Be Determined : To Be Determined	-	0.033	Sep 2020	-		-		-		-	0.000	0.033	-
Hunter UAS Turbocharger Life Management	TBD	To Be Determined : To Be Determined	-	0.023	Sep 2020	-		0.038	Sep 2021	-		0.038	0.000	0.061	-
Hunter UAS Lower Propeller Shafts	TBD	To Be Determined : To Be Determined	-	0.020	Sep 2020	-		-		-		-	0.000	0.020	-



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date: February 2020</b>		
<b>Appropriation/Budget Activity</b> 2040 / 7		<b>R-1 Program Element (Number/Name)</b> PE 0203752A / Aircraft Engine Component Improvement Program		<b>Project (Number/Name)</b> 106 / A/C Compon Improv Prog	

Event Name	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
UAV Shadow Engine																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203752A / Aircraft Engine Component Improvement Program	<b>Project (Number/Name)</b> 106 / A/C Compon Improv Prog

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
T700 Engine Spit Pit Testing	1	2011	4	2012
T700 Engine Temperature Survey	2	2014	4	2015
T55 Engine 1553 Engine Control Unit (ECU)	2	2012	1	2013
T55 Engine N1 Drive Line Redesign	1	2010	4	2012
T55 Engine ECU Block Upgrade	2	2013	4	2015
Auxiliary Power Units (APUs)	1	2014	4	2015
UAV Shadow Engine	2	2014	4	2024
T700 CSI Update	1	2017	4	2017

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

<b>Appropriation/Budget Activity</b>	<b>R-1 Program Element (Number/Name)</b>											
2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	PE 0203758A / <i>Digitization</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	-	6.077	5.270	4.516	-	4.516	4.196	4.196	4.196	4.238	0.000	32.689
374: <i>HOR Battlefield Digitizn</i>	-	6.077	5.270	4.516	-	4.516	4.196	4.196	4.196	4.238	0.000	32.689

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

As the Army Equipping methodology transitions to the Army Modernization Enterprise or AME the information technology used to support Army Equipping must grow and change. The development of an upgraded Army Equipping Enterprise System (AE2S) will integrate and share programming data (dollars and quantities) with information from IT systems that support the Army Futures Command (AFC), ASA(ALT), ASA(FM&C) and Army G3/5/7. This data sharing will allow the AME to provide Army Senior Leaders with a complete picture of how well programs are executing, the impacts of programming decisions on Army current and future readiness and modernization, and help develop a road map needed to transition the current force to a fully modernize Army. The AE2S next generation capability requirements include a flexible data and software architectures that allows the user to integrate disparate data from differing architectures in order to develop new information that can be turned into actionable knowledge by senior leaders. The software architecture must have data visualization capabilities that allow the user to display data in ways that can articulate how AME decisions made impact warfighting effectiveness and plans.

<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	6.308	5.270	4.520	-	4.520
Current President's Budget	6.077	5.270	4.516	-	4.516
Total Adjustments	-0.231	0.000	-0.004	-	-0.004
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.231	-			
• Adjustments to Budget Years	-	-	-0.004	-	-0.004

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203758A / Digitization				<b>Project (Number/Name)</b> 374 / HOR Battlefield Digitizn			
<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>
374: HOR Battlefield Digitizn	-	6.077	5.270	4.516	-	4.516	4.196	4.196	4.196	4.238	0.000	32.689
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

As the Army Equipping methodology transitions to the Army Modernization Enterprise or AME the information technology used to support Army Equipping must grow and change. The development of an upgraded Army Equipping Enterprise System (AE2S) will integrate and share programming data (dollars and quantities) with information from IT systems that support the Army Futures Command (AFC), ASA(ALT), ASA(FM&C) and Army G3/5/7. This data sharing will allow the AME to provide Army Senior Leaders with a complete picture of how well programs are executing, the impacts of programming decisions on Army current and future readiness and modernization, and help develop a road map needed to transition the current force to a fully modernize Army. The AE2S next generation capability requirements include a flexible data and software architectures that allows the user to integrate disparate data from differing architectures in order to develop new information that can be turned into actionable knowledge by senior leaders. The software architecture must have data visualization capabilities that allow the user to display data in ways that can articulate how AME decisions made impact warfighting effectiveness and plans.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Interoperability and Integration</p> <p><b>Description:</b> Funds are to be used for the following efforts</p> <p><b>FY 2020 Plans:</b> FFRDC contractor continues to conduct independent analyses of Army, joint, and multinational interfaces, adherence to standards, implementation profiles and interoperability baselines</p> <p><b>FY 2021 Plans:</b> Contractor will continue to conduct independent analyses of Army, joint, and multinational interfaces, adherence to standards, implementation profiles and interoperability baselines</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase is due to providing increased requirements for independent analyses of Army, joint, and multinational interfaces.</p>	1.448	0.914	1.094
<p><b>Title:</b> Operational Capability Analysis and Evaluation</p> <p><b>Description:</b> Funds are to be used for the following efforts</p> <p><b>FY 2020 Plans:</b></p>	1.480	0.966	1.057

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203758A / Digitization	<b>Project (Number/Name)</b> 374 / HOR Battlefield Digitizn		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>FFRDC contractor continues to conduct iterative capability analyses and assessments consistent with CJCSI 3170 (JCIDS) and 6212 (Net Readiness) to ensure Army and joint program technical and operational requirements are consistent. Efforts support Army and joint initiatives.</p> <p><b>FY 2021 Plans:</b> Contractor will continue to conduct iterative capability analyses and assessments consistent with CJCSI 3170 (JCIDS) and 6212 (Net Readiness) to ensure Army and joint program technical and operational requirements are consistent. Efforts support Army and joint initiatives.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase is due to increased requirements for iterative capability analyses and assessments</p>				
<p><b>Title:</b> Systems Architecture Development</p> <p><b>Description:</b> Funds are to be used for the following efforts</p> <p><b>FY 2020 Plans:</b> FFRDC contractor continues to conduct broad concept studies with emphasis on interoperability and joint/coalition operations.</p> <p><b>FY 2021 Plans:</b> FFRDC contractor will continue to conduct broad concept studies with emphasis on interoperability and joint/coalition operations.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase is due to inflation.</p>		1.099	0.783	0.805
<p><b>Title:</b> AE2S Software</p> <p><b>Description:</b> Procures AE2S software integration and enhancements for the single program language, single platform system that incorporates FDIIS, CEaVa, COP and AFM.</p> <p><b>FY 2020 Plans:</b> Continues to integrate existing code-base for FDIIS, AFM and FDKC to reduce overall cost and maintenance footprint and incorporate the development of new applications to satisfy Strategic Portfolio Analysis Review (SPAR), Sustainment Program Evaluation Group (SS PEG), and Equipping PEG (EE PEG) Manpower.</p> <p><b>FY 2021 Plans:</b> Contractor will continue to incorporate the development of new applications to satisfy Strategic Portfolio Analysis Review (SPAR), Sustainment Program Evaluation Group (SS PEG), and Equipping PEG (EE PEG) Manpower.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>		0.685	1.684	0.558

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203758A / Digitization	<b>Project (Number/Name)</b> 374 / HOR Battlefield Digitizn		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Decrease is due to transition of 95% of the requirement to sustainment.				
<b>Title:</b> Technical Reviews and Technical Performance Analysis		1.351	0.783	0.862
<b>Description:</b> Funds are to be used for the following efforts				
<b>FY 2020 Plans:</b> FFRDC contractor continues to provide technology maturity assessments and prepare technical recommendations in support of Army Transformation and specific technologies of interest to G8. Test and evaluate network systems and infrastructure modeling and simulations.				
<b>FY 2021 Plans:</b> Contractor will continue to provide technology maturity assessments and prepare technical recommendations in support of Army Transformation and specific technologies of interest to G8. Test and evaluate network systems and infrastructure modeling and simulations.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase resulting from increase in requirements for technical recommendation to support Army specific technologies and complexities of evaluating network systems and infrastructure modeling and simulations.				
<b>Title:</b> Academic Research		-	0.140	0.140
<b>Description:</b> Apply university academic and research resources to the integration of Army complex modeling, simulation, and training in support of modernized forces.				
<b>FY 2020 Plans:</b> Continues to apply university academic and research resources to the integration of Army complex modeling, simulation, and training in support of modernized forces.				
<b>FY 2021 Plans:</b> Will continue to apply university academic and research resources to the integration of Army complex modeling, simulation, and training in support of modernized forces.				
<b>Title:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun		0.014	-	-
<b>Accomplishments/Planned Programs Subtotals</b>		6.077	5.270	4.516
<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 Army	<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>
2040 / 7	PE 0203758A / <i>Digitization</i>	374 / <i>HOR Battlefield Digitizn</i>

**D. Acquisition Strategy**

The AE2S development will be done through either a competitive Cost Plus or Fixed Price Incentive contracts that will deliver capabilities in increments, recognizing up front the need for future improvements. The objective of the strategy is to develop and optimize system capabilities while reducing risk and streamlining business and engineering processes.

FFRDC requirements will be accomplished by competitive contract.

Other efforts will be accomplished by various contract methods and types.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203758A / Digitization	<b>Project (Number/Name)</b> 374 / HOR Battlefield Digitizn
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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			
Digitization Technical Integration	Various	Various : Various	5.556	-		-		-		-		-	0.000	5.556	-
Joint & Coalition Interoperability	Various	Various : Various	5.091	-		-		-		-		-	0.000	5.091	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	FY 2018 NDAA SEC 825 MDAP Cost Overrun : FY 2018 NDAA SEC 825 MDAP Cost Overrun	0.014	0.014		-		-		-		-	0.000	0.028	-
<b>Subtotal</b>			10.661	0.014		-		-		-		-	0.000	10.675	N/A

<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			
Army Equipping Enterprise SYstem (AE2S) Software	C/CPFF	TBD : TBD	8.597	0.685		1.684		0.558		-		0.558	Continuing	Continuing	Continuing
Cross-Platform Development	Various	TBD : TBD	3.605	-		-		-		-		-	0.000	3.605	-
<b>Subtotal</b>			12.202	0.685		1.684		0.558		-		0.558	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			
Interoperability and Integration	Various	Various : Various	6.996	1.448		0.914		1.094		-		1.094	0.000	10.452	-
Operational Capability Analysis and Evaluation	Various	VAR : VAR	6.272	1.480		0.966		1.057		-		1.057	0.000	9.775	-
Academic Research	Various	Various : Various	3.231	-		0.140		0.140		-		0.140	0.000	3.511	-
Operational Capability Analysis and Evaluation	Various	Various : Various	5.608	-		-		-		-		-	0.000	5.608	-



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203758A / Digitization	<b>Project (Number/Name)</b> 374 / HOR Battlefield Digitizn
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Event Name	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
Interoperability and Integration																												
Operational Capability Analysis and Evaluation																												
Systems Architecture Development 4.0																												
Systems Architecture Development 5.0																												
Army Equipping Enterprise System (AE2S) Software SW 4.0																												
Army Equipping Enterprise System (AE2S) Software SW 5.0																												
Technical Reviews and Technical Performance Analysis																												
Academic Research																												

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203758A / Digitization	<b>Project (Number/Name)</b> 374 / HOR Battlefield Digitizn
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Interoperability and Integration	1	2016	4	2023
Operational Capability Analysis and Evaluation	1	2016	4	2022
Systems Architecture Development 1.0	2	2015	2	2016
Systems Architecture Development 2.0	3	2016	3	2017
Systems Architecture Development 3.0	4	2017	4	2018
Systems Architecture Development 4.0	1	2019	1	2020
Systems Architecture Development 5.0	2	2020	4	2021
Army Equipping Enterprise System (AE2S) Software SW 1.0	2	2015	2	2016
Army Equipping Enterprise System (AE2S) Software SW 2.0	3	2016	3	2017
Army Equipping Enterprise System (AE2S) Software SW 3.0	4	2017	4	2018
Army Equipping Enterprise System (AE2S) Software SW 4.0	1	2019	1	2020
Army Equipping Enterprise System (AE2S) Software SW 5.0	2	2020	4	2021
Technical Reviews and Technical Performance Analysis	1	2015	4	2022
Academic Research	3	2015	4	2022

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0203801A / <i>Missile/Air Defense Product Improvement 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	-	3.588	1.287	1.288	-	1.288	0.128	0.000	0.000	0.000	0.000	6.291
038: <i>Avenger PIP</i>	-	3.588	1.287	1.288	-	1.288	0.128	0.000	0.000	0.000	0.000	6.291

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

Avenger is a lightweight, ground-to-air missile and gun weapon system mounted on a High Mobility Multi-purpose Wheeled Vehicle. The system protects against unmanned aircraft systems, cruise missiles, and fixed and rotary wing threats. Avenger provides day/night adverse weather operations, shoot on the move capability, rapid target engagement, and remote firing capability. It can be air dropped, lifted by helicopter and is air transportable. The system employs up to eight Stinger missiles to counter aerial threats and a M3P gun for close-in ground and air threats. An Identification Friend or Foe (IFF) system aids in the identification of friendly aircraft in order to minimize the potential for fratricide. The Avenger fleet of 453 systems includes 169 systems that are equipped with a digital Slew-to-Cue (STC) capability to speed target detection and engagement.

The Avenger Modification - Service Life Extension Program (MOD-SLEP) consists of Project 038: Avenger Production Improvement Program (PIP) and Program Element CE8710: Avenger MODS. The ongoing MOD-SLEP addresses obsolescence of Avenger components to ensure Avenger maintains operational capability through Fiscal Year (FY) 2031. Five key MOD-SLEP components are: the Targeting Console (TC), the .50 Caliber Machine Gun (M3P), the Avenger Fire Control Computer (AFCC), the Mode 5 IFF and the Vehicle Internal Communications (VIC-5). Additional Obsolescence Mitigation Items include Avenger Organizational Maintenance Tool Kits, AN/PSM-95 Electronic Systems Test Set and the Avenger Remote Handheld Terminal Unit mounting kits.

The Avenger MOD-SLEP is fielded in two phases. Phase I fields the TC to 169 STC Avengers. Phase II fields the AFCC (169 STC Avengers), VIC-5 and the Mode 5 IFF. The M3P will be fielded through attrition. The TC and AFCC are fielded to the 169 STC Avenger variants only.

FY 2021 funding of \$1.288 million ensures that several Avenger components are viable and sustainable through the end of program life. This includes the initial investigation of technologies that will provide Assured Positioning Navigation and Timing capability, including the Anti-Jam Antenna and DAGR Distributed Device (D3), which will provide M-Code capability. Avenger MOD-SLEP maintains operational capability of Avenger until FY 2031.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0203801A / <i>Missile/Air Defense Product Improvement Program</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	3.641	1.287	1.289	-	1.289
Current President's Budget	3.588	1.287	1.288	-	1.288
Total Adjustments	-0.053	0.000	-0.001	-	-0.001
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.053	-			
• Adjustments to Budget Years	-	-	-0.001	-	-0.001

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>				<b>Project (Number/Name)</b> 038 / <i>Avenger PIP</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>
038: <i>Avenger PIP</i>	-	3.588	1.287	1.288	-	1.288	0.128	0.000	0.000	0.000	0.000	6.291
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Avenger is a lightweight, ground-to-air missile and gun weapon system mounted on a High Mobility Multi-purpose Wheeled Vehicle. The system protects against unmanned aircraft systems, cruise missiles, and fixed and rotary wing threats. Avenger provides day/night adverse weather operations, shoot on the move capability, rapid target engagement, and remote firing capability. It can be air dropped, lifted by helicopter and is air transportable. The system employs up to eight Stinger missiles to counter aerial threats and a M3P gun for close-in ground and air threats. An Identification Friend or Foe (IFF) system aids in the identification of friendly aircraft in order to minimize the potential for fratricide. The Avenger fleet of 453 systems includes 169 systems that are equipped with a digital Slew-to-Cue (STC) capability to speed target detection and engagement.

The Avenger Modification - Service Life Extension Program (MOD-SLEP) consists of Project 038: Avenger Production Improvement Program (PIP) and Program Element CE8710: Avenger MODS. The ongoing MOD-SLEP addresses obsolescence of Avenger components to ensure Avenger maintains operational capability through Fiscal Year (FY) 2031. Five key MOD-SLEP components are: the Targeting Console (TC), the .50 Caliber Machine Gun (M3P), the Avenger Fire Control Computer (AFCC), the Mode 5 IFF and the Vehicle Internal Communications (VIC-5). Additional Obsolescence Mitigation Items include Avenger Organizational Maintenance Tool Kits, AN/PSM-95 Electronic Systems Test Set and the Avenger Remote Handheld Terminal Unit mounting kits.

The Avenger MOD-SLEP is fielded in two phases. Phase I fields the TC to 169 STC Avengers. Phase II fields the AFCC (169 STC Avengers), VIC-5 and the Mode 5 IFF. The M3P will be fielded through attrition. The TC and AFCC are fielded to the 169 STC Avenger variants only.

FY 2021 funding of \$1.288 million ensures that several Avenger components are viable and sustainable through the end of program life. This includes the initial investigation of technologies that will provide Assured Positioning Navigation and Timing capability, including the Anti-Jam Antenna and DAGR Distributed Device (D3), which will provide M-Code capability. Avenger MOD-SLEP maintains operational capability of Avenger until FY 2031.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Avenger MOD-SLEP	3.535	1.287	1.288
<b>Description:</b> The Avenger MOD-SLEP consists of development activities for platform integration, software upgrades, and capability enhancements. Develops and executes test requirements and conducts limited contractor and government testing. Performs technical assessments, concept studies, cost reduction, risk reduction and development documentation.			
<b>FY 2020 Plans:</b>			



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>	<b>Project (Number/Name)</b> 038 / <i>Avenger PIP</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Funding will complete the Materiel Release package for MOD-SLEP. This effort's funding will be executed by Program Executive Office Missiles & Space.			
<b><i>FY 2021 Plans:</i></b> Funding provides for the completion of the MOD-SLEP Phase II Materiel Release (MR). Funding provides for continuing mitigation of emerging obsolescence issues and maintains the viability of the Avenger system. This includes the initial investigation of technologies that will provide Assured Positioning Navigation and Timing capability, including the Anti-Jam Antenna and DAGR D3, which will provide M-Code capability.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> The increase of \$0.001 million from 2020 to 2021 partially compensates for inflation.			
<b><i>Title:</i></b> FY 2019 SBIR / STTR Transfer	0.053	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	3.588	1.287	1.288

<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>
• CE8710: AVENGER MODS	31.093	14.107	13.942	-	13.942	11.381	-	-	-	0.000	70.523

**Remarks**  
CE8710 Avenger MODS procures the MOD-SLEP components for the Avenger system. This ensures that Avenger is viable and sustainable through FY 2031. This program is an integral part of the Army Air and Missile Defense Modernization strategy.

**D. Acquisition Strategy**  
The Avenger MOD-SLEP addresses obsolescence of key components and ensures that Avenger is viable and sustainable through FY 2031.

The MOD-SLEP Phase I component is the TC.

The MOD-SLEP Phase II components are the AFCC, the Mode 5 IFF, the VIC-5 and the M3P machine gun. The M3P machine gun will be fielded through attrition. The other MOD-SLEP Phase II components will be installed in the field as a single installation package.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>	<b>Project (Number/Name)</b> 038 / <i>Avenger PIP</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			
Avenger Modification Management Services	Various	Various : Redstone Arsenal, AL	2.221	0.372	Nov 2018	0.169	Oct 2019	0.136	Oct 2020	-		0.136	0.000	2.898	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	0.053		-		-		-		-	0.000	0.053	-
<b>Subtotal</b>			2.221	0.425		0.169		0.136		-		0.136	0.000	2.951	N/A

<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			
Avenger Modification Product Development	SS/ Various	Raytheon, The Boeing Company and others : Aberdeen Proving Grounds, MD and Huntsville, AL	8.410	1.215	Nov 2018	0.617	Oct 2019	0.443	Oct 2020	-		0.443	0.000	10.685	-
<b>Subtotal</b>			8.410	1.215		0.617		0.443		-		0.443	0.000	10.685	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			
Avenger Modification Test Support	Various	The Boeing Company, Aviation and Missile Research Development and Engineering Center (AMRDEC) and others : Huntsville, AL and Redstone Arsenal, AL	4.855	1.948	Oct 2018	0.501	Oct 2019	0.709	Oct 2020	-		0.709	0.000	8.013	-
<b>Subtotal</b>			4.855	1.948		0.501		0.709		-		0.709	0.000	8.013	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>	<b>Project (Number/Name)</b> 038 / <i>Avenger PIP</i>

Event Name	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
Integration and Testing (MOD-SLEP Phase II)	System Integration and Testing																											
Logistics Demo (MOD-SLEP Phase II)	Log Demo																											
Materiel Release (MOD-SLEP Phase II)									1 Materiel Release																			
Future Modifications to Address Evolving Threats					Evolving Threat Mods																							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>	<b>Project (Number/Name)</b> 038 / <i>Avenger PIP</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Integration and Testing (MOD-SLEP Phase II)	2	2018	2	2020
Live Fire Testing (MOD-SLEP Phase II)	4	2018	4	2018
Logistics Demo (MOD-SLEP Phase II)	2	2019	4	2019
Materiel Release (MOD-SLEP Phase II)	1	2021	1	2021
Future Modifications to Address Evolving Threats	1	2020	4	2021

**Note**

MOD-SLEP Phase II components are the AFCC, IFF, VIC-5 and M3P machine gun.  
 AFCC: Avenger Fire Control Computer  
 IFF: Identification Friend or Foe  
 MOD-SLEP: Modification - Service Life Extension Program  
 VIC: Vehicle Internal Communications

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs
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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	-	4.760	0.000	79.424	2.300	81.724	54.548	23.178	0.000	0.000	0.000	164.210
788: ATACMS PIP	-	4.760	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.760
DZ9: ATACMS Mods	-	0.000	0.000	62.440	-	62.440	54.548	23.178	0.000	0.000	0.000	140.166
VT9: Lethal Miniature Aerial Missile System (LMAMS)	-	0.000	0.000	0.000	2.300	2.300	0.000	0.000	0.000	0.000	0.000	2.300
VV2: TOW	-	0.000	0.000	16.984	-	16.984	0.000	0.000	0.000	0.000	0.000	16.984

**Program MDAP/MAIS Code:** PRE

**Note**  
 Project DZ9 Army Tactical Missile System (ATACMS) Mods was previously funded under Program Element (PE) 0604768A Project P01 Multi-Mode Seeker Development and Test in addition to Strategic Capabilities Office (SCO) funding. Program transitions from the demonstration to product maturation and rapid fielding starting in Fiscal Year (FY) 2021.

Project VT9 Lethal Miniature Aerial Missile System (LMAMS) is a new start in FY 2021.

Project VV2 TOW is a new start in FY 2021.

**A. Mission Description and Budget Item Justification**  
 ATACMS is the United States (U.S.) Army's primary all-weather, surface-to-surface long-range artillery precision guided missile used by Combatant Commanders to shape the battlefield with long-range fires against hard & soft targets in open, complex, and urban environments.

DZ9: Cross Domain (CD) ATACMS is a new variant which integrates a seeker into the ATACMS to expand its capabilities to allow it to search, detect, acquire and engage moving maritime and land targets. This capability is being developed as a SCO demonstration project scheduled to complete in Quarter 2 FY 2021. FY 2021 - FY 2023 funding matures and transitions this capability to the Army to provide a limited deployment to a combatant command in support of the Land Based Anti-Ship Missile Operational Needs Statement (ONS 17-22222).

Funding supports performance analysis, testing, and qualification of the CD ATACMS system design; integration with the command and control system; integration with the launcher; and system safety and supportability requirements necessary for a limited fielding.

VT9: Lethal Miniature Aerial Missile System (LMAMS) is a New Start Project. LMAMS is a single man-portable/operable, light-weight organic, beyond line-of-sight, precision guided, loitering aerial missile system capable of locating and engaging obscured and/or fleeing enemy targets that otherwise cannot be engaged by typical direct fire weapon systems.

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs
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Funding supports engineering and integration of capability improvements identified by trained operators during an Assessment of Operational Utility (AOU) conducted in 2018. Once integrated into the current LMAMS, Production Verification Testing will be conducted to demonstrate successful incorporation of new technology.

VV2: The TOW Weapon System includes the Improved Target Acquisition System (ITAS) launcher, TOW missiles (BGM-71 series), and associated tactical training aids/devices. The TOW Weapon System provides long-range, lethal anti-armor and precision assault fires capability for Army Infantry Brigade Combat Teams (IBCT), Stryker Brigade Combat Teams (SBCT) and Armor Brigade Combat Teams (ABCT) within the Active, Reserve, and National Guard components. The United States Marine Corps (USMC) employs the TOW missile from its ITAS derived M41A7 Saber launchers, anti-tank guided missile (ATGM) vehicles, and AH-1W Cobra helicopters.

The TOW Weapon System improvement program is a New Start Project to integrate US Army missile and ITAS modifications into the TOW Weapon System to improve missile safety (Insensitive Munition upgrades), increase system survivability (counter active protection systems), and increase system network capabilities. These capability improvements support Multi-Domain Operations (MDO) and the Functional Concept for Movement and Maneuver by providing precise lethal capabilities in multiple domains against armored threat systems.

FY 2021 Base dollars in the amount of \$16.984 million will initiate systems engineering to integrate an improved Insensitive Munitions (IM) propulsion system, which will increase missile range, and add a Counter Active Protection System (CAPS) to the TOW missile to enhance missile safety and survivability. The effort will also initiate analysis of requirements for supporting test equipment, launcher, modeling and simulation hardware/software, and test planning for FY 2021.

<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	4.941	0.000	0.000	-	0.000
Current President's Budget	4.760	0.000	79.424	2.300	81.724
Total Adjustments	-0.181	0.000	79.424	2.300	81.724
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.181	-			
• Adjustments to Budget Years	-	-	79.424	2.300	81.724

**Change Summary Explanation**

\$62.440 million of the \$79.424 million base funding increase in FY 2021 due to initial funding for new start program ATACMS Mods (Program Element (PE) 0203802A Other Missile Product Improvement Programs Project DZ9 ATACMS Mods).

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / <i>Other Missile Product Improvement Programs</i>
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\$2.300 million Overseas Contingency Operations (OCO) funding increase in FY 2021 due to initial funding for new start program LMAMS (PE 0203802A Other Missile Product Improvement Programs Project VT9 Lethal Miniature Aerial Missile System (LMAMS)).

\$16.984 million base funding increase in FY 2021 due to initial funding for new start program TOW (PE 0203802A Other Missile Product Improvement Programs Project VV2 TOW).



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs	<b>Project (Number/Name)</b> 788 / ATACMS PIP
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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
788: ATACMS PIP	-	4.760	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.760
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Army Tactical Missile System (ATACMS) Product Improvement Program (PIP) focuses on safety, cost reduction, reliability, deficiency corrections, standardization, and new or improved operational capabilities. There is no funding in Fiscal Year (FY) 2021.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<b>Title:</b> PIP Activities	4.760	-	-	-	-
<b>Description:</b> PIP focuses on safety, cost reduction, reliability, deficiency corrections, standardization, and new or improved operational capabilities for ATACMS.					
<b>Accomplishments/Planned Programs Subtotals</b>	4.760	-	-	-	-

**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
• CA6700: ATACMS MODS	397.236	80.320	141.690	78.434	220.124	-	-	-	-	0.000	697.680

**Remarks**

CA6700 ATACMS Mods is the procurement funding line.

**D. Acquisition Strategy**

After successfully completing operational testing of the height of burst capability via proximity sensor, the Milestone Decision Authority approved in FY 2019 the production and cut in of this capability for unitary missiles. Insensitive munitions and M-code requirements will be addressed by the Army's follow-on long range missile program, Precision Strike Missile. This completes all planned ATACMS missile efforts under 788 ATACMS PIP.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs	<b>Project (Number/Name)</b> 788 / ATACMS PIP
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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			
Government Program Management	MIPR	AMRDEC : RSA	0.300	0.250	Nov 2018	-		-		-		-	0.000	0.550	-
<b>Subtotal</b>			0.300	0.250		-		-		-		-	0.000	0.550	N/A

**Remarks**  
AMRDEC - U.S Army Research, Development and Engineering Command; RSA - Redstone Arsenal, Alabama

<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			
Studies	Various	Various : Various	-	1.390	Nov 2018	-		-		-		-	0.000	1.390	-
Prototyping	C/CPFF	LMMFC : Dallas, TX	-	1.787	Mar 2019	-		-		-		-	0.000	1.787	-
<b>Subtotal</b>			-	3.177		-		-		-		-	0.000	3.177	N/A

**Remarks**  
LMMFC - Lockheed Martin Missiles and Fire Control

<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	Various	Various : Various	4.500	1.333	Nov 2018	-		-		-		-	0.000	5.833	-
<b>Subtotal</b>			4.500	1.333		-		-		-		-	0.000	5.833	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>		4.800	4.760	0.000	-	-	-	0.000	9.560	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs	<b>Project (Number/Name)</b> 788 / ATACMS PIP

Event Name	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
Operational Test Planning & Execution	[Blue bar]																											
Prox Sensor Cut-In Decision	[Blue triangle with '1']																											
Insensitive Munitions Study	[Blue bar]																											
GPS M-Code Study, Qualification & Integration	[Blue bar]																											
Flight Test Support/Equipment (HWIL, Flight Termination System)	[Blue bar]																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / <i>Other Missile Product Improvement Programs</i>	<b>Project (Number/Name)</b> 788 / <i>ATACMS PIP</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Operational Test Planning & Execution	1	2018	1	2019
Develop Test & Evaluation Master Plan (TEMP) for Height of Burst	1	2018	2	2018
HWIL Models & Simulation	2	2018	3	2018
Conduct Operational Test Flight Preparations & OT Flight Testing	2	2018	3	2018
Operational Test Reports	4	2018	4	2018
Prox Sensor Cut-In Decision	2	2019	2	2019
Insensitive Munitions Study	1	2019	4	2019
GPS M-Code Study, Qualification & Integration	1	2019	4	2019
Flight Test Support/Equipment (HWIL, Flight Termination Systems, Modeling & Sim)	1	2019	4	2019

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs				<b>Project (Number/Name)</b> DZ9 / ATACMS Mods			
<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>
DZ9: ATACMS Mods	-	0.000	0.000	62.440	-	62.440	54.548	23.178	0.000	0.000	0.000	140.166
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

CD ATACMS prior year funding from Fiscal Year (FY) 2018 to FY 2020 was under Program Element (PE) 0604768A Brilliant Anti-Armor Submunition (BAT) Project P01 P01 MULTI - MODE SEEKER DEVELOPMENT AND TEST. No previous funding was allocated to this PE.

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

Army Tactical Missile System (ATACMS) is the United States (U.S.) Army's primary 24/7, all-weather, and surface-to-surface artillery precision missile used by current and future Combatant Commanders to shape the battlefield with long-range fires against hard and soft stationary targets in open, complex, and urban environments. Cross Domain (CD) ATACMS is a new variant which integrates a seeker into the ATACMS to expand its capabilities to allow it to search, detect, acquire and engage moving maritime and land targets. This capability is being developed as a SCO demonstration project scheduled to complete in Quarter 2 FY 2021. FY 2021 - FY 2023 funding matures and transitions this capability to the Army to provide a limited deployment to a combatant command in support of the Land Based Anti-Ship Missile Operational Needs Statement (ONS17-22222).

Funding supports performance analysis, testing, and qualification of the CD ATACMS system design, integration with the command and control system, integration with the launcher, and system safety and supportability requirements necessary for a limited fielding. CD ATACMS prior year funding from FY 2018 to FY 2020 was under PE 0604768A Brilliant Anti-Armor Submunition (BAT) Project P01 P01 MULTI - MODE SEEKER DEVELOPMENT AND TEST. No previous funding was allocated to this PE.

**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> Transition of SCO demonstrated capabilities to defeat maritime and land targets	-	-	62.440	-	62.440
<b>Description:</b> Begin the transition and development of an interim capability to effectively engage moving maritime and land targets out to a range of 300 kilometer. Supports the long range precision fires requirements of the Multi-Domain Task Force in response to the Land Based Anti-Ship Missile Operational Needs Statement (ONS 17-22222).					
<b>FY 2021 Base Plans:</b> Funding supports performance analysis, testing, and qualification of the CD ATACMS system design; integration with the command and control system; integration with the launcher; and system safety and supportability requirements necessary for a limited fielding.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>					

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs	<b>Project (Number/Name)</b> DZ9 / ATACMS Mods
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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
Increased funding of \$62.500 million funds transition of CD ATACMS from Strategic Capabilities Office to the Army and matures the prototype to a tactical configuration of CD ATACMS suitable for a limited fielding as an urgent material release to a combatant command. This effort was previously funded under PE 0604768A Brilliant Anti-Armor Submunition (BAT) Project P01 Multi-Mode Seeker Development and Test.					
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	62.440	-	62.440

<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>
• CA6700: ATACMS MODS	397.236	80.320	141.690	78.434	220.124	-	-	-	-	0.000	697.680

**Remarks**  
Limited procurement of up to 102 CD ATACMS variant missiles is planned to be funded under Procurement's CA6700 ATACMS MODS.

**D. Acquisition Strategy**  
The CD ATACMS program leverages prototypes under development to support an Office of Secretary of Defense (OSD) Strategic Capabilities Office demonstration in FY 2020 and FY 2021; the CD ATACMS program begins a qualification effort in FY 2021 of the design to support limited production to meet an urgent operational requirement. The qualification effort identifies capabilities and limitations of the prototypes, adds operational systems not included in the demonstration, and addresses critical updates needed for fielding. Lockheed Martin Missile and Fire Control (LMMFC) will develop, integrate, qualify and flight test CD ATACMS missiles under this effort.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs	<b>Project (Number/Name)</b> DZ9 / ATACMS Mods
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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			
Government Program Management	Various	Various : RSA	-	-		-		4.390	Nov 2020	-		4.390	19.200	23.590	-
<b>Subtotal</b>			-	-		-		4.390		-		4.390	19.200	23.590	N/A

**Remarks**  
RSA - Redstone Arsenal

<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			
Command & Control	MIPR	Various : Various	-	-		-		2.500	Nov 2020	-		2.500	1.600	4.100	-
Modeling & Simulation	MIPR	CCDC AvMC : RSA	-	-		-		3.710	Nov 2020	-		3.710	12.080	15.790	-
Engineering, System Safety & Supportability	MIPR	Various : RSA	-	-		-		2.150	Nov 2020	-		2.150	14.810	16.960	-
System Maturation & Qual	C/FFP	LMMFC : Dallas, TX	-	-		-		40.990	Nov 2020	-		40.990	106.913	147.903	-
<b>Subtotal</b>			-	-		-		49.350		-		49.350	135.403	184.753	N/A

**Remarks**  
LMMFC - Lockheed Martin Missiles and Fire Control; CCDC AvMC - Combat Capabilities Development Command Aviation and Missile Center

<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	Various	Various : Various	-	-		-		8.700	Apr 2021	-		8.700	24.264	32.964	-
<b>Subtotal</b>			-	-		-		8.700		-		8.700	24.264	32.964	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	62.440	-	62.440	178.867	241.307	N/A

**UNCLASSIFIED**

<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>							<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 2040 / 7			<b>R-1 Program Element (Number/Name)</b> PE 0203802A / <i>Other Missile Product Improvement Programs</i>			<b>Project (Number/Name)</b> DZ9 / <i>ATACMS Mods</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



**UNCLASSIFIED**

<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs	<b>Project (Number/Name)</b> DZ9 / ATACMS Mods

Event Name	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
Demonstration Phase (SCO)	█																											
Subsystem Qual, Test Support Articles	█												█															
EDT Flight Tests	█																█											
SQT Flight Tests	█																				█							
User Demo	█																								█			
System Maturation/Safety/Supportability	█																				█							
Command and Control Software Updates (Launcher and AFATDS)	█																█											

**UNCLASSIFIED**

<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / <i>Other Missile Product Improvement Programs</i>	<b>Project (Number/Name)</b> DZ9 / <i>ATACMS Mods</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Demonstration Phase (SCO)	1	2019	2	2021
Subsystem Qual, Test Support Articles	1	2022	4	2022
EDT Flight Tests	1	2023	2	2023
SQT Flight Tests	3	2023	1	2024
User Demo	3	2024	3	2024
System Maturation/Safety/Supportability	2	2020	2	2024
Command and Control Software Updates (Launcher and AFATDS)	1	2020	2	2023

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs			<b>Project (Number/Name)</b> VT9 / Lethal Miniature Aerial Missile System (LMAMS)				
<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>
VT9: Lethal Miniature Aerial Missile System (LMAMS)	-	0.000	0.000	0.000	2.300	2.300	0.000	0.000	0.000	0.000	0.000	2.300
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This is a new start in FY2021.

Project VT9 Lethal Miniature Aerial Missile System (LMAMS) is a new start project in Fiscal Year (FY) 2021.

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

VT9: Lethal Miniature Aerial Missile System (LMAMS) is a single man-portable/operable, light-weight organic, beyond line-of-sight, precision guided, loitering aerial missile system capable of locating and engaging obscured and/or fleeing enemy targets that otherwise cannot be engaged by typical direct fire weapon systems.

Funding supports engineering and integration of capability improvements identified by trained operators during an Assessment of Operational Utility (AOU) conducted in 2018. Once integrated into the current LMAMS, Production Verification Testing will be conducted to demonstrate successful incorporation of new technology.

New start project in FY 2021.

**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> LMAMS Capability Improvements	-	-	0.000	2.300	2.300
<b>Description:</b> Joint Urgent Operational Need (JUON) User Required Capability Improvements supporting CC-0556.					
<b>FY 2021 Base Plans:</b> N/A					
<b>FY 2021 OCO Plans:</b> Develop improved image processing and integrate upgraded optics package to include upgraded tablet controller.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>					

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs	<b>Project (Number/Name)</b> VT9 / Lethal Miniature Aerial Missile System (LMAMS)

<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>
New start project.					
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	0.000	2.300	2.300

<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>
• C88001: LETHAL MINIATURE AERIAL MISSILE SYSTEM (LMAMS)	104.973	83.300	0.000	84.993	84.993	-	-	-	-	0.000	273.266

**Remarks**

**D. Acquisition Strategy**

This effort will be awarded through competition. Analysis to determine the Acquisition Strategy is ongoing.

**UNCLASSIFIED**

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs	<b>Project (Number/Name)</b> VT9 / Lethal Miniature Aerial Missile System (LMAMS)
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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			
System Engineering / Program Management	MIPR	CCDC Aviation & Missile Center : Redstone Arsenal, AL	-	-		-		0.000		0.193	Jan 2021	0.193	0.000	0.193	-
<b>Subtotal</b>			-	-		-		0.000		0.193		0.193	0.000	0.193	N/A

<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			
Improve Image Processing and Upgrade Optics Package	C/FFP	TBD : TBD	-	-		-		0.000		2.061	Mar 2021	2.061	0.000	2.061	-
<b>Subtotal</b>			-	-		-		0.000		2.061		2.061	0.000	2.061	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			
Product Verification Testing	MIPR	Dugway Proving Grounds : Dugway, UT	-	-		-		0.000		0.046	Sep 2021	0.046	0.000	0.046	-
<b>Subtotal</b>			-	-		-		0.000		0.046		0.046	0.000	0.046	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	2.300	0.000	2.300

**Remarks**

**UNCLASSIFIED**

<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs	<b>Project (Number/Name)</b> VT9 / Lethal Miniature Aerial Missile System (LMAMS)	

Event Name	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				
Product Development and Integration									■																							
Production Verification Testing													■																			
Test Reporting																	■															
Engineering Change Proposal Incorporation																					▲ 1											

**UNCLASSIFIED**

<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / <i>Other Missile Product Improvement Programs</i>	<b>Project (Number/Name)</b> VT9 / <i>Lethal Miniature Aerial Missile System (LMAMS)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Product Development and Integration	2	2021	1	2022
Production Verification Testing	4	2021	1	2022
Test Reporting	1	2022	2	2022
Engineering Change Proposal Incorporation	3	2022	3	2022

**UNCLASSIFIED**

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / <i>Other Missile Product Improvement Programs</i>	<b>Project (Number/Name)</b> VV2 / TOW
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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
VV2: TOW	-	0.000	0.000	16.984	-	16.984	0.000	0.000	0.000	0.000	0.000	16.984
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This is a new start in FY2021.

Project VV2 TOW is a new start in Fiscal Year (FY) 2021.

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

Project VV2 TOW Weapon System includes the ITAS launcher, TOW missiles (BGM-71 series), and associated tactical training aids/devices. The TOW Weapon System provides long-range, lethal anti-armor and precision assault fires capability for Army Infantry Brigade Combat Teams (IBCT), Stryker Brigade Combat Teams (SBCT) and Armor Brigade Combat Teams (ABCT) within the Active, Reserve, and National Guard components. The United States Marine Corps (USMC) employs the TOW missile from its ITAS derived M41A7 Saber launchers, ATGM vehicles, and AH-1W Cobra helicopters.

The TOW Weapon System improvement program is a New Start Project to integrate US Army missile and ITAS modifications into the TOW Weapon System to improve missile safety (Insensitive Munition upgrades), increase system survivability (counter active protection systems), and increase system network capabilities. These capability improvements support Multi-Domain Operations (MDO) and the Functional Concept for Movement and Maneuver by providing precise lethal capabilities in multiple domains against armored threat systems.

FY 2021 Base dollars in the amount of \$16.984 million will initiate systems engineering to integrate an improved Insensitive Munitions (IM) propulsion system, which will increase missile range, and add a Counter Active Protection System (CAPS) to the TOW missile to enhance missile safety and survivability. The effort will also initiate analysis of requirements for supporting test equipment, launcher, modeling and simulation hardware/software, and test planning for FY 2021.

Supports Next Generation Combat Vehicle (NGCV) Optionally Manned Fighting Vehicle (OMFV) Multi-purpose Guided Missile (MPGM) requirements.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<b>Title:</b> TOW Kilo (BGM-71K) Integration and Qualification	-	-	16.984	-	16.984
<b>FY 2021 Base Plans:</b>					



**UNCLASSIFIED**

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs	<b>Project (Number/Name)</b> VV2 / TOW
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**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Conduct competitive acquisition through model based system engineering to deliver analysis, technical requirements/design documentation, and key components for integration of Insensitive Munitions (IM) Motor and CAPS improvements.					
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> VV2 / TOW is a New Start Project.					
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	16.984	-	16.984

**C. 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>
• C59300: TOW 2 System Summary	119.062	118.458	121.074	-	121.074	90.708	153.176	178.104	176.010	0.000	956.592
• C61700: ITAS/TOW Mods	3.173	3.469	5.666	-	5.666	-	-	-	-	0.000	12.308

**Remarks**

**D. Acquisition Strategy**

Analysis to determine the Acquisition Strategy for this competitive effort is ongoing.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / Other Missile Product Improvement Programs	<b>Project (Number/Name)</b> VV2 / TOW	

Event Name	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
Component Design Engineering									██████████																			
Component Design Review									▲																			
Component Prototype Hardware Build													██████████															

**UNCLASSIFIED**

<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203802A / <i>Other Missile Product Improvement Programs</i>	<b>Project (Number/Name)</b> VV2 / TOW

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Component Design Engineering	2	2021	1	2022
Component Design Review	4	2021	4	2021
Component Prototype Hardware Build	4	2021	2	2022

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0203808A / <i>TRACTOR CARD</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	-	34.050	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	34.050
DS1: <i>TRACTOR BARN</i>	-	13.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	13.000
DS2: <i>Tractor Puma</i>	-	5.432	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.432
E11: <i>DELL</i>	-	15.618	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.618

**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.

**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	34.050	0.000	0.000	-	0.000
Current President's Budget	34.050	0.000	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

**UNCLASSIFIED**

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

Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0203808A / TRACTOR CARD				Project (Number/Name) DS1 / TRACTOR BARN			
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
DS1: TRACTOR BARN	-	13.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	13.000
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).

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

<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203808A / TRACTOR CARD				<b>Project (Number/Name)</b> DS2 / Tractor Puma			
<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>
DS2: <i>Tractor Puma</i>	-	5.432	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.432
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).

**UNCLASSIFIED**

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

<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0203808A / <i>TRACTOR CARD</i>				<b>Project (Number/Name)</b> E11 / <i>DELL</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>
E11: <i>DELL</i>	-	15.618	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.618
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).



**UNCLASSIFIED**

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0205402A / <i>Integrated Base Defense - Operational System Dev</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	-	8.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.000
EF2: <i>Integrated Base Defense</i>	-	8.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.000

**Note**

Beginning in FY 2017 Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E) funding is under PE0605033A Project EQ3. Beginning in FY 2017 Integrated Ground Security, Surveillance and Response Capability (IGSSR-C) funding is under PE0605029A Project EQ2.

Beginning in FY 2020 Integrated Base Defense (IBD) and Counter Vehicle Borne Improvised Explosive Device (CVBIED) efforts are funded under PE0604785A Project DS4.

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

Integrated Base Defense (IBD): The purpose of IBD Kitting is to harvest and refurbish physical security and Force Protection (FP) Non-Standard Equipment (NS-E) and package them into integrated and interoperable IBD Capabilities. IBD provides integration of software and analytical capability to support the integration of systems in the field. IBD employs an enterprise approach to enable IBD capabilities across the operational spectrum by leveraging interoperability efforts in support of the Integrated Unit, Base and Installation Protection (IUBIP) framework. In support of JUONS 0540 to address the Vehicle Borne Improvised Explosive Device (VBIED) threat. Additional capabilities are being developed and integrated to the current Force Protection structure.

Justification: There is no FY 2021 funding requested for this PE.

<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	8.000	0.000	0.000	-	0.000
Current President's Budget	8.000	0.000	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

**UNCLASSIFIED**

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205402A / <i>Integrated Base Defense - Operational System Dev</i>	<b>Project (Number/Name)</b> EF2 / <i>Integrated Base Defense</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
EF2: <i>Integrated Base Defense</i>	-	8.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Beginning in FY 2017 Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E) funding is under PE0605033A Project EQ3. Beginning in FY 2017 Integrated Ground Security, Surveillance and Response Capability (IGSSR-C) funding is under PE0605029A Project EQ2.

Beginning in FY 2020 Integrated Base Defense (IBD) / Counter Vehicle Borne Improvised Explosive Device (CVBIED) program funding is under PE0604785A Project DS4.

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

Integrated Base Defense (IBD): The purpose of IBD is to harvest and refurbish physical security and FP Non-Standard Equipment and package them into integrated and interoperable IBD Capabilities. IBD provides integration of software and analytical capability to support the integration of systems in the field. IBD employs an enterprise approach to enable IBD capabilities across the operational spectrum by leveraging interoperability efforts in support of the Integrated Unit, Base and Installation Protection framework. Additionally, IBD is being updated in response to JUONS 0540 to address the Vehicle Borne Improvised Explosive Device (VBIED) threat. These capabilities are being developed and integrated into the current Force Protection infrastructure.

FY 2021: No funding requested for this PE

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<b>Title:</b> IBD JUONS 0540	8.000	-	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	8.000	-	-	-	-

**C. 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>
• M90115: INTEG BASE DEF NONSTAND EQUIP (IBD NS-E) KITTING	39.200	39.984	0.000	64.584	64.584	-	-	-	-	0.000	143.768

**Remarks**

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205402A / Integrated Base Defense - Operational System Dev	Project (Number/Name) EF2 / Integrated Base Defense

**D. Acquisition Strategy**

The IBD acquisition strategy is to leverage existing IBD-related government organizations and to competitively award multiple contracts in support of IBD objectives for the development of holistic IBD architectures and products to support interoperability of fielded and emerging IBD-related systems.

**UNCLASSIFIED**

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205402A / <i>Integrated Base Defense - Operational System Dev</i>	<b>Project (Number/Name)</b> EF2 / <i>Integrated Base Defense</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			
G-BOSS(E) Project Management	MIPR	PM EOIR : Fort Belvoir, VA	0.288	-		-		-		-		-	0.000	0.288	-
IGSSR-C Project Management	MIPR	PM EOIR : Fort Belvoir, VA	0.175	-		-		-		-		-	0.000	0.175	-
IBD Engineering and Management Services	Allot	Joint Project Manager Guardian Joint Product Manager Force Protection Services : Fort Belvoir, VA	0.630	-		-		-		-		-	0.000	0.630	-
JUONS 0540 PMO	TBD	PdM FPS : Fort Belvoir, VA	-	0.460	Dec 2018	-		-		-		-	0.000	0.460	-
<b>Subtotal</b>			1.093	0.460		-		-		-		-	0.000	1.553	N/A

<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			
G-BOSS(E) Design	MIPR	NSWC Crane : Crane, IN	1.985	-		-		-		-		-	0.000	1.985	-
G-BOSS(E) Prototypes	MIPR	RDECOM CERDEC : Fort Belvoir, VA	2.733	-		-		-		-		-	0.000	2.733	-
IGSSR-C Design	C/CPFF	TBD : TBD	2.653	-		-		-		-		-	0.000	2.653	-
IBD Architecture and Software Development	C/CR	AMRDEC : Huntsville, AL	4.985	-		-		-		-		-	0.000	4.985	-
IBD Design and Build	C/CR	AMRDEC : Huntsville, AL	0.750	-		-		-		-		-	0.000	0.750	-
JUONS 0540 integration	C/CR	AMRDEC : Huntsville, AL	-	4.040	Jan 2019	-		-		-		-	0.000	4.040	-
<b>Subtotal</b>			13.106	4.040		-		-		-		-	0.000	17.146	N/A

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205402A / <i>Integrated Base Defense - Operational System Dev</i>	<b>Project (Number/Name)</b> EF2 / <i>Integrated Base Defense</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			
G-BOSS(E) Design Support	MIPR	RDECOM CERDEC : Fort Belvoir, VA	0.502	-		-		-		-		-	0.000	0.502	-
IGSSR-C Design Support	MIPR	RDECOM CERDEC : Fort Belvoir, VA	0.547	-		-		-		-		-	0.000	0.547	-
JUONS 0540 Support	MIPR	NVESD/ARL : Fort Belvoir, VA	-	0.500	Feb 2019	-		-		-		-	0.000	0.500	-
<b>Subtotal</b>			1.049	0.500		-		-		-		-	0.000	1.549	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			
IBD Test and Evaluation	MIPR	ATEC : Aberdeen Proving Ground, MD	2.722	-		-		-		-		-	0.000	2.722	-
JUONS 0540 Test and Evaluation	MIPR	ATEC : Aberdeen Proving Ground, MD	-	3.000	May 2019	-		-		-		-	0.000	3.000	-
<b>Subtotal</b>			2.722	3.000		-		-		-		-	0.000	5.722	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>		17.970	8.000	0.000	-	-	0.000	25.970	N/A

**Remarks**

**UNCLASSIFIED**

<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205402A / <i>Integrated Base Defense - Operational System Dev</i>	<b>Project (Number/Name)</b> EF2 / <i>Integrated Base Defense</i>	

Event Name	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
IBD JUONS 540 Integration	██████████				██████████																							
IBD JUONS 540 ATEC Testing	██████████																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205402A / <i>Integrated Base Defense - Operational System Dev</i>	<b>Project (Number/Name)</b> EF2 / <i>Integrated Base Defense</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
IBD CONOPS & Architecture	2	2016	1	2017
IBD Development Integration and Testing	3	2017	1	2018
IBD JUONS 540 Integration	1	2017	3	2019
IBD JUONS 540 ATEC Testing	1	2019	4	2019

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

<b>Appropriation/Budget Activity</b>					<b>R-1 Program Element (Number/Name)</b>							
2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					PE 0205410A / Materials Handling Equipment							
<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	-	1.132	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
EE9: Material Handling Equipment - Advance Development	-	1.132	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 element supports component development and Material Handling Equipment (MHE) prototyping, and stays abreast of emerging and available technologies to be integrated into military MHE to address identified capability gaps and warfighter objectives. This project enables the development of selected technologies and transition to system integration and development or production of MHE products. MHE includes Rough Terrain Forklifts, All Terrain Lifting Army System (ATLAS), Rough Terrain Container Handlers (RTCH), as well as ancillary MHE equipment, to support distribution of critical supplies in the theater of operations.

<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	1.462	0.000	0.000	-	0.000
Current President's Budget	1.132	0.000	0.000	-	0.000
Total Adjustments	-0.330	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.283	-			
• SBIR/STTR Transfer	-0.047	-			



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0205410A / <i>Materials Handling Equipment</i>				<b>Project (Number/Name)</b> EE9 / <i>Material Handling Equipment - Advance 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>
EE9: <i>Material Handling Equipment - Advance Development</i>	-	1.132	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 supports component development and Material Handling Equipment (MHE) prototyping and stays abreast of emerging and available technologies to be integrated into military MHE to address identified capability gaps and warfighter objectives. This project enables the development of selected technologies and transition to system integration and development or production of MHE products. MHE includes Rough Terrain Forklifts, All Terrain Lifting Army System (ATLAS), Rough Terrain Container Handlers (RTCH), as well as ancillary MHE equipment to support distribution of critical supplies in the theater of operations.

**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> System Engineering/Program Management	1.132	-	-	-	-
<b>Description:</b> Funds for Material Handling Equipment System Engineering and Program Management.					
<b>Accomplishments/Planned Programs Subtotals</b>	1.132	-	-	-	-

**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>
• G41001: <i>Family Of Forklifts</i>	12.901	19.016	16.145	1.885	18.030	14.440	14.737	12.663	12.657	Continuing	Continuing
• MA4501: <i>MODIFICATION KITS</i>	15.693	48.821	19.386	-	19.386	19.819	21.331	7.385	10.849	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

Conduct research, development, and investigations on future Material Handling Equipment (MHE) and identify the path forward for programs of record (POR) to be transitioned for Program Executive Officer Program Management. Identify technical advancements that can improve safety, reliability, survivability, transportability, availability, maintainability and reduce the logistical footprints for current and future MHE equipment.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date: February 2020</b>		
<b>Appropriation/Budget Activity</b> 2040 / 7		<b>R-1 Program Element (Number/Name)</b> PE 0205410A / <i>Materials Handling Equipment</i>		<b>Project (Number/Name)</b> EE9 / <i>Material Handling Equipment - Advance Development</i>	

Event Name	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
System Engineering/Program Management																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205410A / <i>Materials Handling Equipment</i>	<b>Project (Number/Name)</b> EE9 / <i>Material Handling Equipment - Advance Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
System Engineering/Program Management	4	2019	2	2020

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0205412A / Environmental Quality Technology - Operational System Dev
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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	-	0.249	10.000	0.259	-	0.259	0.265	0.775	0.283	0.286	0.000	12.117
EE6: Environmental Information Tech Modernization	-	0.249	10.000	0.259	-	0.259	0.265	0.775	0.283	0.286	0.000	12.117

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

The Environmental Information Technology Management (EITM) program includes support for the Defense Environment, Safety & Occupational Health Network Information Exchange (DENIX) defense business system, as well as its database and reporting application, the Knowledge Based Corporate Reporting System (KBCRS). This request for research, development, test and evaluation (RDTE) is to implement necessary enhancements to facilitate DENIX's Platform-as-a-Service capabilities, with additional modernizations that will improve the DoD's ESOH system of record and reporting tool set. This also includes upgrades to incorporate ongoing cybersecurity, cloud computing, and other information technology requirements.

<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	0.249	0.732	0.259	-	0.259
Current President's Budget	0.249	10.000	0.259	-	0.259
Total Adjustments	0.000	9.268	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-0.732			
• Congressional Rescissions	-	-			
• Congressional Adds	-	10.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

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

**Project:** EE6: Environmental Information Tech Modernization

Congressional Add: Securing the availability of green, enhanced coatings

Congressional Add Subtotals for Project: EE6

Congressional Add Totals for all Projects

	FY 2019	FY 2020
	-	10.000
Congressional Add Subtotals for Project: EE6	-	10.000
Congressional Add Totals for all Projects	-	10.000

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0205412A / <i>Environmental Quality Technology - Operational System Dev</i>				<b>Project (Number/Name)</b> EE6 / <i>Environmental Information Tech Modernization</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>
EE6: <i>Environmental Information Tech Modernization</i>	-	0.249	10.000	0.259	-	0.259	0.265	0.775	0.283	0.286	0.000	12.117
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Environmental Information Technology Management (EITM) program includes support for the Defense Environment, Safety & Occupational Health Network and Information Exchange (DENIX) defense business system, as well as its database and reporting application, the Knowledge Based Corporate Reporting System (KBCRS). This request for research, development, test, and evaluation (RDTE) is to implement necessary enhancements to facilitate DENIX's Platform-as-a-Service (PaaS) capabilities, with additional modernizations that will improve the DoD's ESOH system of record and reporting tool set. This also includes upgrades to incorporate ongoing cybersecurity, cloud computing, and other information technology requirements.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Environmental Information Technology Modernization	0.249	-	0.259
<b>Description:</b> Prototype, develop, and implement platform enhancements as required to meet data management requirements for the Defense Environment, Safety & Occupational Health Network and Information Exchange (DENIX) and its reporting application, the Knowledge Based Corporate Reporting System (KBCRS).			
<b>FY 2021 Plans:</b> The DENIX platform will continue to use machine learning algorithms to ?learn? the business processes and rules used by OSD for the environmental data calls (Defense Environmental Programs Annual Report to Congress and the Environmental Management Review). ?Learning? this information will pave the way for the prototyping of a tool that will allow KBCRS to predict anomalies and trends in data input, improving data quality.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The EITM program requests a steady state of funding each year to implement necessary enhancements to facilitate DENIX's Platform-as-a-Service capability. Every three years, the program requests additional funding to implement and modernize DENIX, the DoD's system of record and reporting tool st for environment, safety and occupation health.			
<b>Accomplishments/Planned Programs Subtotals</b>	0.249	-	0.259

	<b>FY 2019</b>	<b>FY 2020</b>
<b>Congressional Add:</b> Securing the availability of green, enhanced coatings	-	10.000

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205412A / <i>Environmental Quality Technology - Operational System Dev</i>	<b>Project (Number/Name)</b> EE6 / <i>Environmental Information Tech Modernization</i>
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	<b>FY 2019</b>	<b>FY 2020</b>
<b>FY 2020 Plans:</b> Securing the availability of green, enhanced coatings		
<b>Congressional Adds Subtotals</b>	-	10.000

**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>
• OMA - 432612000: <i>Information Mgmt - Automation</i>	-	-	-	-	-	-	-	-	-	-	

**Remarks**

Information Mgmt - Automation 43261200 - This is the associated OMA line that provides daily support for the DoD Environment, Safety & Occupational Health Network Information Exchange and associated applications. EITM is managed as a Defense Business System #3180.

**D. Acquisition Strategy**

The Deputy Assistant Secretary of the Army for Environment, Safety & Occupational Health is the designated Executive Agent for the Environmental Information Technology Management (EITM) program. Defined by the DoD Directive 4715.1E, the EITM mission is to ensure efficient use of enterprise environment, safety, and occupational health (ESOH) corporate information management processes by providing and sustaining requirement-driven ESOH corporate data management, Congressional-reporting, and public outreach tools to the DoD, and other DoD stakeholders. Funding provided for this program will allow EITM to continue to develop and modernize the platform to meet Army and DoD policy-driven cloud computing and cybersecurity requirements. Prior to funding being committed, DoD ESOH stakeholders and authoritative information technology organizations were consulted to determine necessary system interface upgrades to be incorporated. Expanding DENIX's architecture to create a Level 2 container separate from the current Level 4 container will not only provide a more secure, cybersecurity risk-adverse environment, but it will also optimize performance, capabilities, and mandatory reporting for ESOH stakeholders using a PaaS delivery model. This phased solution begins in FY 2018 by prototyping of system architecture optimization that improves user experience, enabling web conferencing in FY 2019 and applying machine learning concepts to improve data quality in FY 2020-2022.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205412A / Environmental Quality Technology - Operational System Dev	<b>Project (Number/Name)</b> EE6 / Environmental Information Tech Modernization
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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			
System enhancements for required network interfaces to support EITM mission.	C/FFP	Delta Resources : Alexandria, VA	0.457	0.249		-		0.259		-		0.259	0.000	0.965	-
Congressional Add - securing the availability of green, enhanced coatings	TBD	TBD : TBD	-	-		10.000		-		-		-	0.000	10.000	-
<b>Subtotal</b>			0.457	0.249		10.000		0.259		-		0.259	0.000	10.965	N/A
<b>Project Cost Totals</b>			0.457	0.249		10.000		0.259		-		0.259	0.000	10.965	N/A

**Remarks**  
The \$10,000 from FY20 is a congressional addition. The \$10,000 is misaligned into this PE/PROJ.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205412A / <i>Environmental Quality Technology - Operational System Dev</i>	<b>Project (Number/Name)</b> EE6 / <i>Environmental Information Tech Modernization</i>	

Event Name	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
Split architecture prototype																												
User experience and containerization																												
Webinars/virtual conferencing prototype and development																												
Machine learning algorithms																												
Machine learning prototype																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205412A / <i>Environmental Quality Technology - Operational System Dev</i>	<b>Project (Number/Name)</b> EE6 / <i>Environmental Information Tech Modernization</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Split architecture prototype	2	2019	2	2020
User experience and containerization	3	2019	3	2021
Webinars/virtual conferencing prototype and development	1	2020	4	2020
Machine learning algorithms	1	2020	4	2021
Machine learning prototype	4	2020	4	2022

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					<b>R-1 Program Element (Number/Name)</b> PE 0205456A / Lower Tier Air and Missile Defense (AMD) System							
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	-	74.295	97.746	0.166	-	0.166	0.169	0.000	0.000	0.000	0.000	172.376
EF9: System Integration and Test	-	74.295	97.746	0.166	-	0.166	0.169	0.000	0.000	0.000	0.000	172.376

**Program MDAP/MAIS Code:** 505

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

The PATRIOT system includes a family of hardware, software, interceptors (PAC-2, Guidance Enhanced Missiles, PAC-3 and PAC-3 Missile Segment Enhancement) and Ground Support Equipment. As software and hardware improvements are developed, there is a continuing need for system level modeling, simulation, integration and testing. Modeling and Simulation (M&S) allow for performance assessment against all threats that would not be possible in flight tests due to cost, target and range constraints. Flight testing is periodically required for validation of the modeling and simulation as well as satisfying Army Test and Evaluation Command/Director, Operational Test and Evaluation (ATEC/DOE) requirements of segment improvements. The Lower Tier AMD System line also supports identification, analysis, design, and test materiel solutions to counter cyber security and electronic warfare shortcomings to all elements of the Lower Tier Battle Space.

PATRIOT is an integral part of the overall Air and Missile Defense (AMD) Architecture and enables the incremental fielding of the system capability for Army Air and Missile Defense Battalions.

Program Element (PE) 0205456A Lower Tier Air and Missile Defense (AMD) System funding will be realigned to PE 0607865A Patriot Product Improvement beginning of Fiscal Year (FY) 2021, to PE 0607865A Patriot Product Improvement and C12101000 Lower Tier Air and Missile Defense Sensor beginning of FY 2022.

<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	77.188	107.746	111.080	-	111.080
Current President's Budget	74.295	97.746	0.166	-	0.166
Total Adjustments	-2.893	-10.000	-110.914	-	-110.914
• Congressional General Reductions	-	-	-	-	-
• Congressional Directed Reductions	-	-10.000	-	-	-
• Congressional Rescissions	-	-	-	-	-
• Congressional Adds	-	-	-	-	-
• Congressional Directed Transfers	-	-	-	-	-
• Reprogrammings	-0.018	-	-	-	-
• SBIR/STTR Transfer	-2.875	-	-	-	-
• Adjustments to Budget Years	-	-	-110.914	-	-110.914

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0205456A / Lower Tier Air and Missile Defense (AMD) System				<b>Project (Number/Name)</b> EF9 / System Integration and Test			
<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>
EF9: System Integration and Test	-	74.295	97.746	0.166	-	0.166	0.169	0.000	0.000	0.000	0.000	172.376
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The PATRIOT system includes a family of hardware, software, interceptors (PAC-2, Guidance Enhanced Missiles, PAC-3 and PAC-3 Missile Segment Enhancement) and Ground Support Equipment. As software and hardware improvements are developed, there is a continuing need for system level modeling, simulation, integration and testing. Modeling and Simulation (M&S) allow for performance assessment against all threats that would not be possible in flight tests due to cost, target and range constraints. Flight testing is periodically required for validation of the modeling and simulation as well as satisfying Army Test and Evaluation Command/Director, Operational Test and Evaluation (ATEC/DOTE) requirements of segment improvements. The Lower Tier AMD System line also supports identification, analysis, design, and test materiel solutions to counter cyber security and electronic warfare shortcomings to all elements of the Lower Tier Battle Space.

PATRIOT is an integral part of the overall Air and Missile Defense (AMD) Architecture and enables the incremental fielding of the system capability for Army Air and Missile Defense Battalions.

Program Element (PE) 0205456A Lower Tier Air and Missile Defense (AMD) System funding will be realigned to PE 0607865A Patriot Product Improvement beginning of Fiscal Year (FY) 2021, to PE 0607865A Patriot Product Improvement and C12101000 Lower Tier Air and Missile Defense Sensor beginning of FY 2022.

**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> Program Development, Integration, and Support	38.621	31.256	0.166	-	0.166
<b>Description:</b> Funding provides program development, integration, and support for the Lower Tier Air and Missile Defense System.					
<b>FY 2020 Plans:</b>					
-Will continue program development through system level modeling, simulation, integration and testing support.					
-Will continue integration of missile and ground system hardware and software to complete PDB-8.1 activities.					
<b>FY 2021 Base Plans:</b>					
Beginning FY 2021, PE 0205456A / Lower Tier Air and Missile Defense (AMD) System funding will be realigned to PE 0607865A Patriot Product Improvement. The remaining FY 2021 funds of \$166 thousand will be used for SMDC support.					
<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 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205456A / Lower Tier Air and Missile Defense (AMD) System	<b>Project (Number/Name)</b> EF9 / System Integration and Test

<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>
Beginning FY 2021, PE 0205456A Lower Tier Air and Missile Defense (AMD) System funding will be realigned to PE 0607865A Patriot Product Improvement.					
<b>Title:</b> Testing, Targets, Modeling and Simulation <b>FY 2020 Plans:</b> -Will continue the testing program to include utilization of targets/threat simulators, flight simulator and modeling efforts. -Will continue test activities to support the TEMP. -Will continue system testing/analysis for PDB-8.1 DTE and LUT. -Will continue planning, integration and testing of missile and ground system hardware and software to complete PDB 8.1 activities. -Will continue PATRIOT program M&S laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements. -Will continue planning, design, and acquisition of long lead Targets for PDB 8.1 Testing. -Will continue Ballistic Missile Defense System (BMDS) Integration Testing. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Beginning FY 2021, PE 0205456A Lower Tier Air and Missile Defense (AMD) System funding will be realigned to PE 0607865A Patriot Product Improvement.	35.674	62.073	-	-	-
<b>Title:</b> FY 2020 SBIR/STTR Transfer <b>Description:</b> Funding transferred in accordance with Title 15 USC ?638 <b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638 <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638	-	4.417	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	74.295	97.746	0.166	-	0.166

<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>
• C53101: MSE Missile	1,131.276	702.437	603.188	176.585	779.773	765.887	1,008.835	908.799	804.295	Continuing	Continuing

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army									<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7				<b>R-1 Program Element (Number/Name)</b> PE 0205456A / Lower Tier Air and Missile Defense (AMD) System				<b>Project (Number/Name)</b> EF9 / System Integration and Test			

**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
• C50016: System Integration and Test Procurement	105.395	107.157	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• S40: Army Integrated Air and Missile Defense	318.850	208.638	193.929	-	193.929	63.678	33.162	94.758	74.936	0.000	987.951
• BZ5075: IAMD Battle Command System	-	29.629	201.587	-	201.587	353.561	416.995	413.356	417.415	Continuing	Continuing
• 0604741A: Air Defense Command, Control and Intelligence - Eng Dev	208.965	33.502	43.651	27.000	70.651	49.051	39.720	24.397	16.692	0.000	442.978
• AD5070: AIR & MSL Defense Planning & Control Sys	29.913	39.061	47.374	15.143	62.517	68.778	102.399	-	-	0.000	302.668
• EX2: Lower Tier Air Missile Defense (LTAMD) Capability	84.981	379.772	376.373	-	376.373	332.007	241.235	87.419	88.298	0.000	1,590.085
• 0604319A: Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	10.324	-	0.000	-	0.000	-	-	-	-	0.000	10.324
• C62002: IFPC INC 2- I BLOCK 1 SYSTEM	31.286	9.337	106.261	-	106.261	237.803	392.134	368.447	274.566	0.000	1,419.834
• EY7: IFPC Increment 2 - Block 1	92.674	194.366	235.770	-	235.770	341.077	181.830	98.210	13.639	0.000	1,157.566

**Remarks**

This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

**D. Acquisition Strategy**

The ongoing design and developmental activities enable modeling and simulation infrastructure maintenance and upgrades coupled with end to end testing of the Lower Tier architecture against the evolving threat as an element of an integrated Air and Missile Defense system. This strategy minimizes technological risks and provides a means of enhancing system capability through planned upgrades of deployed systems. Lower Tier system development efforts enable further improvement of system capabilities against emerging and reactive threats. Developing, fabricating and testing hit to kill surface to air missile and associated ground support equipment provides essential increases in battle space, accuracy, lethality and firepower to counter and destroy evolving air defense threats. These state-of-the-art capabilities and enhancements require ongoing demonstration through a series of flight tests and modeling and simulation activities.

Beginning in FY 2021, these efforts will be funded through PE 0607865A Patriot Product Improvement.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205456A / Lower Tier Air and Missile Defense (AMD) System	<b>Project (Number/Name)</b> EF9 / System Integration and Test
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<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>			
Government Program Management	MIPR	Various : Huntsville, Alabama	4.428	1.123	Dec 2018	1.890	Dec 2019	-		-		-	0.000	7.441	-
PAC-3 Product Office	RO	Project Office : Huntsville, AL	3.504	1.663	Oct 2018	1.331	Oct 2019	-		-		-	0.000	6.498	-
SMDC DA Civilian Labor	IA	SMDC : SMDC	-	-		-		0.166	Dec 2020	-		0.166	0.000	0.166	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		4.417		-		-		-	0.000	4.417	-
<b>Subtotal</b>			7.932	2.786		7.638		0.166		-		0.166	0.000	18.522	N/A

<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>			
Program Integration MSE LMMFC	Various	Lockheed Martin Missiles and Fire Control (LMMFC) : Dallas, Texas	42.183	13.237	Feb 2019	16.032	Feb 2020	-		-		-	0.000	71.452	-
MSE/PAC-3 Raytheon	Various	Raytheon : Waltham, Massachusetts	18.417	6.930	Feb 2019	7.332	Feb 2020	-		-		-	0.000	32.679	-
SETA Contracts	Various	Multiple : Multiple	6.891	1.096	Feb 2019	2.377	Feb 2020	-		-		-	0.000	10.364	-
U.S. Other Government Agencies (OGAs)	MIPR	Various : Huntsville, Alabama	24.887	9.602	Dec 2018	6.252	Dec 2019	-		-		-	0.000	40.741	-
<b>Subtotal</b>			92.378	30.865		31.993		-		-		-	0.000	155.236	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>			
Targets/Threats Simulators	MIPR	Various : Huntsville, Alabama	92.393	14.878	Feb 2019	24.778	Feb 2020	-		-		-	0.000	132.049	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205456A / Lower Tier Air and Missile Defense (AMD) System	<b>Project (Number/Name)</b> EF9 / System Integration and Test
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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>			
Modeling and Simulation	MIPR	Various : Huntsville, Alabama	13.474	3.779	Jan 2019	3.132	Jan 2020	-		-		-	0.000	20.385	-
Contractor T&E	Various	Multiple : Multiple	16.955	2.003	Feb 2019	9.362	Feb 2020	-		-		-	0.000	28.320	-
Other T&E funding	MIPR	Various : WSMR, NM	12.147	3.246	May 2019	3.516	Feb 2020	-		-		-	0.000	18.909	-
Mobile Flight Mission Simulator (MFMS)	SS/FFPLOE	Raytheon : Massachusetts	12.074	1.080	Jan 2019	0.632	Jan 2020	-		-		-	0.000	13.786	-
PDB-8	MIPR	Various : WSMR, NM	9.140	15.658	Feb 2019	16.695	Feb 2020	-		-		-	0.000	41.493	-
PDB-8 DT/OT	MIPR	Various : WSMR, NM	14.887	-		-		-		-		-	0.000	14.887	-
<b>Subtotal</b>			171.070	40.644		58.115		-		-		-	0.000	269.829	N/A
<b>Project Cost Totals</b>			271.380	74.295		97.746		0.166		-		0.166	0.000	443.587	N/A

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205456A / Lower Tier Air and Missile Defense (AMD) System	<b>Project (Number/Name)</b> EF9 / System Integration and Test

Event Name	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>PATRIOT System Testing, Integration and Evaluation</b>																												
Program Development, Integration, and Support																												
Testing, Targets, Modeling and Simulation																												
PDB-8 Fielding																												
PDB 8.1																												
Developmental/Operational Flight Testing																												

**Note**  
Please note, beginning in FY21 these activities will be funded through 0607865A / Patriot Product Improvement.

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205456A / <i>Lower Tier Air and Missile Defense (AMD) System</i>	<b>Project (Number/Name)</b> EF9 / <i>System Integration and Test</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
PATRIOT System Testing, Integration and Evaluation	1	2015	4	2020
Program Development, Integration, and Support	1	2015	4	2020
Testing, Targets, Modeling and Simulation	1	2015	4	2020
PDB-8.0.5 Agile Build	1	2017	4	2018
PDB-8 Fielding	2	2018	4	2020
PDB-8 IOC	3	2018	3	2018
PDB 8.1	1	2018	4	2020
Developmental/Operational Flight Testing	3	2020	4	2020

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</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	-	113.471	117.294	75.575	-	75.575	64.728	19.722	20.005	19.951	0.000	430.746
EG2: <i>GMLRS Alternative Warheads</i>	-	0.000	11.566	14.515	-	14.515	24.386	0.000	0.000	0.000	0.000	50.467
EG3: <i>Guided MLRS</i>	-	113.471	105.728	61.060	-	61.060	40.342	19.722	20.005	19.951	0.000	380.279

**Program MDAP/MAIS Code:** 260

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

Guided Multiple-Launch Rocket System (GMLRS) rockets are surface-to-surface artillery rockets fired from the Multiple Launch Rocket System (MLRS) and High Mobility Artillery Rocket System (HIMARS) launchers. GMLRS rockets provide 24/7, all-weather precision fires to engage both area and point targets at short, medium, and long ranges. The GMLRS Program currently consists of multiple variants: GMLRS Unitary utilizes a 200 pound high explosive warhead to engage point targets with limited collateral damage; GMLRS Dual Purpose Improved Conventional Munition (DPICM) cluster munition to engage area or imprecisely located targets and GMLRS Alternative Warhead (AW) which has been developed as a non-cluster munition to engage the same target set as GMLRS DPICM. GMLRS DPICM Production was terminated in response to the June 2008 Department of Defense (DoD) Cluster Munitions Policy. GMLRS Unitary and AW are currently in full rate production.

The 26 October 2016 Deputy Secretary's Management Action Group (DMAG) directed the Army to define and execute an effort for GMLRS modifications that would extend the maximum range (Extended Range (ER) GMLRS) and integrate sensors and seekers into the rocket to engage complex targets with greater precision at greater ranges. These modifications to GMLRS were designated by the Army Acquisition Executive as an engineering change proposal (ECP) and not as a new start effort.

The GMLRS program will continue to leverage ongoing Government and Industry research and development efforts to extend range, increase survivability, and enhance lethality. The EG2 funding line will enable the seeker modification. The EG3 funding line enables GMLRS enhancements, including ER GMLRS modification, statutorily required upgrades, and obsolescence mitigation and upgrades.

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</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	118.955	138.594	54.328	-	54.328
Current President's Budget	113.471	117.294	75.575	-	75.575
Total Adjustments	-5.484	-21.300	21.247	-	21.247
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-21.300			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-5.484	-			
• Adjustments to Budget Years	-	-	21.247	-	21.247

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>				<b>Project (Number/Name)</b> EG2 / <i>GMLRS Alternative Warheads</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>
EG2: <i>GMLRS Alternative Warheads</i>	-	0.000	11.566	14.515	-	14.515	24.386	0.000	0.000	0.000	0.000	50.467
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The United States (U.S.) Army initially funded the development of the Guided Multiple Launch Rocket System (GMLRS) Alternative Warhead (AW) increment under the EG2 - GMLRS Alternative Warheads project code. GMLRS AW entered full rate production in 2015. The 26 October 2016 Deputy Secretary's Management Action Group (DMAG) directed the Army to define and execute an effort for a GMLRS modification that would integrate a seeker into the rocket.

Funding identified in Fiscal Year (FY) 2020 - FY 2022 will support the technology transition, development, and demonstration of a seeker into the GMLRS and will help define a common seeker solution for the entire MLRS Family of Munitions (MFOM). The modification to integrate a seeker will leverage the Extended Range (ER) GMLRS and culminate in a proof of concept demonstration of the seeker capability.

**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> GMLRS seeker development	-	11.041	14.515	-	14.515
<b>Description:</b> Integrate a seeker into the GMLRS and conduct a proof of concept demonstration					
<b>FY 2020 Plans:</b> Performed initial trade studies to define System Weight and Performance challenges. Conducted preliminary rocket integration studies. Investigated Tactics, Techniques and Procedures (TTPs) and concept of operations (CONOPS) for an advanced seeker. Performed initial investigation into modifications needed in launcher/rocket software and Command and Control for integration of an advanced seeker.					
<b>FY 2021 Base Plans:</b> Perform Risk Reduction activities, including identification of suitable seeker and radome solutions and preliminary characterization of seeker and radome for integration. Modify existing GMLRS flight profiles, command and control software, seeker aiming algorithms, and seeker components for the ER GMLRS flight environments. Begin integration of a seeker and radome into an ER GMLRS.					
<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 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	<b>Project (Number/Name)</b> EG2 / <i>GMLRS Alternative Warheads</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>
Funding increase is due to the transition from the initial phase involving analysis of system requirements to a more detailed phase involving identification and characterization of seeker, radome, and rocket solutions.					
<b>Title:</b> FY 2020 SBIR/STTR Transfer	-	0.525	-	-	-
<b>Description:</b> Funding transferred in accordance with Title 15 USC 638					
<b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC 638					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC 638					
<b>Accomplishments/Planned Programs Subtotals</b>	-	11.566	14.515	-	14.515

<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>
• C64400: <i>Guided MLRS Rocket (GMLRS)</i>	975.507	1,176.406	850.157	127.015	977.172	808.559	984.484	990.005	960.079	Continuing	Continuing
• EG3: <i>Guided MLRS</i>	113.471	105.728	61.060	-	61.060	40.342	19.722	20.005	19.951	Continuing	Continuing
• C57701: <i>GMLRS MOD</i>	0.266	5.094	0.000	-	0.000	-	-	-	-	Continuing	Continuing

**Remarks**  
GMLRS missile Army procurement funding (MiPA) includes C65404 and C65406.

**D. Acquisition Strategy**  
GMLRS AW is currently in Full Rate Production. The seeker effort will conclude with a proof of concept demonstration. Design and integration processes will be executed upon receipt of additional funding to allow for maturation of seeker technology and integration into the ER GMLRS rocket. All GMLRS variants are procured under C64400; procurement of a seeker capable GMLRS variant will be integrated into annual GMLRS production contracts.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / Guided Multiple-Launch Rocket System (GMLRS)	<b>Project (Number/Name)</b> EG2 / GMLRS Alternative Warheads
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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			
Government Program Management	MIPR	PFRMS Project Office, : RSA	4.948	-		-		-		-		-	0.000	4.948	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.525		-		-		-	0.000	0.525	-
<b>Subtotal</b>			4.948	-		0.525		-		-		-	0.000	5.473	N/A

**Remarks**  
PFRMS-Precision Fires Rocket and Missile Systems; RSA-Redstone Arsenal

<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			
AWP Contracts (Multiple)	Various	NGIS (Plymouth, MN) LMMFC (Dallas, TX) : Systems Integrator	9.955	-		-		-		-		-	0.000	9.955	-
Seeker & Radome Contracts	SS/CPIF	LMMFC : Dallas, TX	-	-		8.687	Mar 2020	11.757	Jan 2021	-		11.757	0.000	20.444	-
Other Government Agencies	MIPR	AMCOM/ : CCDC, RSA	3.557	-		2.121	Feb 2020	2.342	Jan 2021	-		2.342	0.000	8.020	-
<b>Subtotal</b>			13.512	-		10.808		14.099		-		14.099	0.000	38.419	N/A

**Remarks**  
AWP-Alternative Warhead Program; Various-Competitive/Firm Fixed Price/Sole Source/Cost Plus Fixed Fee; AMCOM-Army Materiel Command; AMRDEC-U.S. Army Research, Development and Engineering Command; RSA-Redstone Arsenal; NGIS -Northrop Grumman Innovation Systems; MN-Minnesota; LMMFC-Lockheed Martin Missile and Fire Control; TX-Texas

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	<b>Project (Number/Name)</b> EG2 / <i>GMLRS Alternative Warheads</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 Contracts	C/CPFF	Various : Various	0.237	-		0.233	Feb 2020	0.416	Jan 2021	-		0.416	0.000	0.886	-
<b>Subtotal</b>			0.237	-		0.233		0.416		-		0.416	0.000	0.886	N/A

**Remarks**  
C/CPFF-Competitive/Cost Plus Fixed Fee

<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	MIPR	WSMR, : NM	14.363	-		-		-		-		-	0.000	14.363	-
<b>Subtotal</b>			14.363	-		-		-		-		-	0.000	14.363	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>			33.060	-		11.566		14.515		-		14.515	0.000	59.141	N/A

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	<b>Project (Number/Name)</b> EG2 / <i>GMLRS Alternative Warheads</i>

Event Name	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 Demonstrate a Seeker																												
Trade Studies																												
Radome Development																												
Seeker Characterization																												
Rocket Integration																												
Concept Demonstration																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	<b>Project (Number/Name)</b> EG2 / <i>GMLRS Alternative Warheads</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Integrate and Demonstrate a Seeker	1	2020	4	2022
Trade Studies	1	2020	1	2021
Radome Development	1	2021	2	2022
Seeker Characterization	1	2021	4	2022
Rocket Integration	2	2021	4	2022
Concept Demonstration	3	2022	4	2022

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>				<b>Project (Number/Name)</b> EG3 / <i>Guided MLRS</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>
EG3: <i>Guided MLRS</i>	-	113.471	105.728	61.060	-	61.060	40.342	19.722	20.005	19.951	0.000	380.279
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The United States (U.S.) Army continues to explore ways to enhance Guided Multiple Launch Rocket System (GMLRS) rockets and common components and to mitigate obsolescence issues under Project EG3 Guided MLRS. The Army is requesting funding for the following GMLRS Research, Development, Test and Evaluation (RDT&E) activities: (1) evaluation of enhanced operational capabilities to provide more flexibility across the target set to include increased range, flight performance, and end-game optimization; (2) investigation of potential life cycle cost savings through obsolescence initiatives and second source qualification; (3) development of enhancements to the MLRS common test equipment; (4) evaluation and development of technologies to enhance overall product performance and survivability to include Positioning, Navigation and Timing (PNT); and (5) system test and evaluation.

The Fiscal Year (FY) 2021 dollars in the amount of \$61.060 million will continue the design, qualification, and testing of an extended range variant of the GMLRS; and continue qualification of key rocket obsolescence upgrades.

**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> GMLRS enhancements	14.850	9.680	9.249	-	9.249
<b>Description:</b> Assess and improve GMLRS rockets					
<b>FY 2020 Plans:</b> Developed and assessed methods to improve rocket effectiveness. Continued to assess payload options to meet Objective Additional Performance Attributes (APAs).					
<b>FY 2021 Base Plans:</b> Will develop and assess methods to improve rocket effectiveness. Continue to assess payload options to meet Objective Additional Performance Attributes (APAs).					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decrease from FY 2020 to FY 2021 is due to the prioritization of funding available to support EG3 development efforts.					
<b>Title:</b> GMLRS cost savings initiatives and obsolescence mitigation	20.715	8.072	6.090	-	6.090
<b>Description:</b> Address obsolescence cost, study cost reduction initiatives and opportunities for second source supplier efficiencies, and increase system survivability. Development of a second ER GMLRS rocket motor					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	<b>Project (Number/Name)</b> EG3 / <i>Guided MLRS</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>vendor to introduce competition and reduce costs for this component by allowing the prime to compete during production.</p> <p><b>FY 2020 Plans:</b> Continued to design and qualify an optimized MFOM-qualified Guidance Set. Continued to develop a second source vendor for the Extended Range GMLRS rocket motor.</p> <p><b>FY 2021 Base Plans:</b> Effort that began in FY 2020 to design and qualify an optimized MFOM-qualified Guidance Set will continue into FY 2021.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decrease from FY 2020 to FY 2021 is due to the prioritization of funding available to support EG3 development efforts.</p>					
<p><b>Title:</b> Extended Range (ER) GMLRS and complementary rocket pod development</p> <p><b>Description:</b> Conduct system test and evaluation activities for ER GMLRS and Insensitive Munitions (IM).</p> <p><b>FY 2020 Plans:</b> Completed ER GMLRS system-level ground testing, including Insensitive Munitions (IM) testing. Continued ER GMLRS System Qualification Flight Testing and conduct a User Demonstration and an In-Theater Flight Demonstration. Conducted Operational Flight Software Functional Qualification Testing (FQT) and Launcher Integration Testing (LIT).</p> <p><b>FY 2021 Base Plans:</b> Will complete ER GMLRS System Qualification flight testing and perform a system demonstration.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decreases are due to the completion of ground testing.</p>	19.709	15.440	7.590	-	7.590
<p><b>Title:</b> Extended Range (ER) GMLRS development</p> <p><b>Description:</b> Qualification and integration of ER GMLRS.</p> <p><b>FY 2020 Plans:</b></p>	58.197	67.735	38.131	-	38.131

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	<b>Project (Number/Name)</b> EG3 / <i>Guided MLRS</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>Conducted ER GMLRS component and system-level critical design and the system-level software design. Completed ER GMLRS Cooperative Vulnerability and Penetration Assessment. Continued ER GMLRS facilitation planning, and conducted Production Line Validations (PLVs) at the component and system level.</p> <p><b>FY 2021 Base Plans:</b> Conduct the Logistics Demo and the Prognostic/Diagnostic Demo as well as delivering the Practical and Classroom Explosive Ordnance (EOD) trainers. Complete the ER GMLRS Functional Configuration Audit (FCA). Resolve issues identified during ER GMLRS Cooperative Vulnerability and Penetration Assessment/ Adversarial Assessment.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding decrease from FY 2020 to FY 2021 is due to the completion of the design and development effort and a shift in focus to qualification and Test and Evaluation.</p>					
<p><b>Title:</b> FY 2020 SBIR/STTR Transfer</p> <p><b>Description:</b> Funding transferred in accordance with Title 15 USC 638</p> <p><b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC 638</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC 638</p>	-	4.801	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	113.471	105.728	61.060	-	61.060

<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>
• C64400: <i>Guided MLRS Rocket (GMLRS)</i>	975.507	1,176.406	850.157	127.015	977.172	808.559	984.484	990.005	960.079	Continuing	Continuing
• EG2: <i>GMLRS Alternative Warheads</i>	-	11.566	14.515	-	14.515	24.386	-	-	-	0.000	50.467
• C57701: <i>GMLRS MOD</i>	0.266	5.094	0.000	-	0.000	-	-	-	-	Continuing	Continuing
<b>Remarks</b>	GMLRS Procurement funding includes C65404 and C65406.										

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	<b>Project (Number/Name)</b> EG3 / <i>Guided MLRS</i>

**D. Acquisition Strategy**

Project EG3 Guided MLRS is intended to support, investigate, and develop alternative material changes to improve the GMLRS family of munitions as they are identified by the material developer or combat developer. This project also supports Insensitive Munitions (IM) activities to improve the overall posture of the system down to component level. The ER GMLRS effort is pursuing a strategy of modifying the current GMLRS system through the Engineering Change Proposal (ECP) process in order to increase its range. ER GMLRS is a development and qualification effort performed as a modification to the current GMLRS, leveraging existing contract vehicles where practicable.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / Guided Multiple-Launch Rocket System (GMLRS)	<b>Project (Number/Name)</b> EG3 / Guided MLRS
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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			
Government Program Management	MIPR	Various : RSA	10.300	5.959	Oct 2018	1.433	Feb 2020	1.343	Jan 2021	-		1.343	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		4.801		-		-		-	0.000	4.801	-
<b>Subtotal</b>			10.300	5.959		6.234		1.343		-		1.343	Continuing	Continuing	N/A

**Remarks**  
RSA-Redstone Arsenal, Alabama

<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			
Unitary Contracts/Multiple	SS/FPIF	LMMFC : Dallas, TX	30.764	29.606	Jan 2019	16.319	Mar 2020	13.996	Jan 2021	-		13.996	Continuing	Continuing	Continuing
IM Development & Qualification Contracts/ Multiple	C/FPIF	Orbital ATK, Aerojet Rocketdyne : Rocket Center, WV; Bristow, VA	36.380	-		-		-		-		-	0.000	36.380	-
GMLRS Extended Range	SS/CPFF	LMMFC : Dallas, TX	68.499	58.197	Jan 2019	67.735	Jul 2020	38.131	May 2021	-		38.131	Continuing	Continuing	Continuing
<b>Subtotal</b>			135.643	87.803		84.054		52.127		-		52.127	Continuing	Continuing	N/A

**Remarks**  
SS/FPIF-Sole Source/Fixed-Price Incentive Firm; LMMFC - Lockheed Martin Missile and Fire Control; TX - Texas; C/FPIF - Competitive/Fixed-Price Incentive Firm; WV - West Virginia; VA - Virginia; TBD - To Be Determined

<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	MIPR	Various : Various	15.916	19.709	Oct 2018	15.440	Feb 2020	7.590	Jan 2021	-		7.590	Continuing	Continuing	Continuing
<b>Subtotal</b>			15.916	19.709		15.440		7.590		-		7.590	Continuing	Continuing	N/A

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	<b>Project (Number/Name)</b> EG3 / <i>Guided MLRS</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**  
Performing Activities include Army Research, Development and Engineering Command (AMRDEC), Army Research Laboratory (ARL), and Redstone Test Center (RTC). FY 2020 Test Support cost was previously overstated and included costs that should have been reflected in GMLRS Extended Range Product Development, this issue has been corrected on this form.

	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>	161.859	113.471	105.728	61.060	-	61.060	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	<b>Project (Number/Name)</b> EG3 / <i>Guided MLRS</i>

Event Name	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
Assess and improve GMLRS rockets	[Blue bar]																											
Obsolescence/Cost Reduction Opportunities and 2nd Source	[Blue bar]																											
Second Source ER GMLRS Motor	[Blue bar]																											
IM/Enhanced Technology Improvements	[Blue bar]																											
Conduct System Test and Evaluation activities	[Blue bar]																											
ER GMLRS Design Verification Testing	[Blue bar]																											
ER GMLRS Ground Testing	[Blue bar]																											
ER GMLRS System Qualification Flight Testing	[Blue bar]																											
ER GMLRS Operational Testing	[Blue bar]																											
Flight Termination System Development	[Blue bar]																											
Qualification and Integration of GMLRS extended range effort	[Blue bar]																											
Preliminary Design Reviews	[Blue bar]																											
Critical Design Reviews	[Blue bar]																											

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / Guided Multiple-Launch Rocket System (GMLRS)	<b>Project (Number/Name)</b> EG3 / Guided MLRS
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Event Name	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				
Operational Flight Software Development																																
ER GMLRS Cooperative Vulnerability Identification																																
ER GMLRS Cooperative Vuln and Penetration Assessment																																
Engineering Change Proposal (ECP) Cut-in Decision																																

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	<b>Project (Number/Name)</b> EG3 / <i>Guided MLRS</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Assess and improve GMLRS rockets	1	2015	4	2025
Obsolescence/Cost Reduction Opportunities and 2nd Source	1	2015	4	2025
Second Source ER GMLRS Motor	4	2020	4	2020
IM/Enhanced Technology Improvements	1	2015	4	2025
Configuration System Qualification Ground/Flight Testing	4	2015	4	2018
M-Code/NAVSTRIKE-M (GPS receiver) Qualification	3	2018	4	2018
System Qual and testing of Side Mounted Proximity Sensor	1	2018	2	2018
Conduct qualification and testing for program	1	2015	4	2018
Conduct System Test and Evaluation activities for IMPS program	4	2015	4	2018
Conduct System Test and Evaluation activities	4	2015	1	2022
ER GMLRS Design Verification Testing	2	2020	4	2020
ER GMLRS Ground Testing	2	2020	2	2021
ER GMLRS System Qualification Flight Testing	4	2020	3	2021
ER GMLRS Operational Testing	4	2021	4	2021
Flight Termination System Development	3	2018	1	2021
Qualification and Integration of GMLRS extended range effort	3	2018	1	2020
Preliminary Design Reviews	4	2018	2	2019
Critical Design Reviews	3	2019	4	2020
Operational Flight Software Development	3	2018	1	2021
ER GMLRS Cooperative Vulnerability Identification	2	2019	2	2019
ER GMLRS Cooperative Vuln and Penetration Assessment	4	2021	4	2021
Engineering Change Proposal (ECP) Cut-in Decision	1	2022	1	2022

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208053A / <i>Joint Tactical Ground 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	-	0.000	0.000	9.510	-	9.510	9.665	7.073	7.076	7.080	0.000	40.404
635: <i>Joint Tact Grd Station-P3I(MIP)</i>	-	0.000	0.000	9.510	-	9.510	9.665	7.073	7.076	7.080	0.000	40.404

**Note**  
Beginning in FY 2021, funding has been moved from PE 1208053A to PE 0208053A.

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

The Joint Tactical Ground Station (JTAGS) is a post-production, ACAT III program. JTAGS provides missile warning message data for the Air and Missile Defense (AMD) architecture and improves performance for Integrated Air and Missile Defense Fire Control Systems/Composite Army Air and Missile Defense Brigades. JTAGS disseminates near real time warning, alerting, and cueing information on ballistic missile launches and other tactical events of interest throughout the theater using existing communication networks, providing critical support to Combatant Commanders in their Areas of Responsibility (AOR). Four OCONUS deployed JTAGS units, which are deployed in three theaters (PACOM, CENTCOM, EUCOM), constitute DoD's only in-theater system providing space-based missile warning. The fifth CONUS system is used as an institutional trainer though is available as a deployable asset. JTAGS is designated as the in-theater element of the United States Strategic Command's Theater Event System (TES), supporting all Theater Missile Defense pillars, affording the shortest sensor to shooter connectivity. On 14 January 2016, the Army Acquisition Executive designated the JTAGS Pre-Planned Product Improvement (JTAGS P3I) program as a separate ACAT III modification program.

The JTAGS Program Element (PE) supports development and test to meet JTAGS Operational Requirement(s) Document (ORD) thresholds using improved sensors and algorithms as Pre-Planned Product Improvements (P3I). P3I Improvements upgrade JTAGS to a new Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, and improves warning tactical parameters and timeliness. JTAGS Block II is on contract for a two-Phase development effort. JTAGS Block II Phase 1 is complete. JTAGS Block II Phase 2 activities are broken into three spirals to expedite delivering critical capabilities sooner. Phase 2 Spiral 1 and Spiral 2 will be completed in FY 2020.

FY 2021 requested funding of \$9.510 million will allow for the integration of evolving cyber hardening advances, emerging threats, and planning of a JTAGS P3I Block II operational test.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0208053A / <i>Joint Tactical Ground System</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
Current President's Budget	0.000	0.000	9.510	-	9.510
Total Adjustments	0.000	0.000	9.510	-	9.510
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	9.510	-	9.510

**Change Summary Explanation**

Beginning in FY 2021 Joint Tactical Ground System (JTAGS) requested funding has been realigned from PE 1208053A to PE 0208053A.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0208053A / Joint Tactical Ground System				<b>Project (Number/Name)</b> 635 / Joint Tact Grd Station-P3I(MIP)			
<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>
635: Joint Tact Grd Station-P3I(MIP)	-	0.000	0.000	9.510	-	9.510	9.665	7.073	7.076	7.080	0.000	40.404
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Beginning in FY 2021 Joint Tactical Ground System (JTAGS) requested funding has been realigned from PE 1208053A / FE7 to PE 0208053A.

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

The Joint Tactical Ground Station (JTAGS) is a post-production, ACAT III program. JTAGS provides missile warning message data for the Air and Missile Defense (AMD) architecture and improves performance for Integrated Air and Missile Defense Fire Control Systems/Composite Army Air and Missile Defense Brigades. JTAGS disseminates near real time warning, alerting, and cueing information on ballistic missile launches and other tactical events of interest throughout the theater using existing communication networks, providing critical support to Combatant Commanders in their Areas of Responsibility (AOR). Four OCONUS deployed JTAGS units, which are deployed in three theaters (PACOM, CENTCOM, EUCOM), constitute DoD's only in-theater system providing space-based missile warning. The fifth CONUS system is used as an institutional trainer though is available as a deployable asset. JTAGS is designated as the in-theater element of the United States Strategic Command's Theater Event System (TES), supporting all Theater Missile Defense pillars, affording the shortest sensor to shooter connectivity. On 14 January 2016, the Army Acquisition Executive designated the JTAGS Pre-Planned Product Improvement (JTAGS P3I) program as a separate ACAT III modification program.

The JTAGS Program Element (PE) supports development and test to meet JTAGS Operational Requirement(s) Document (ORD) thresholds using improved sensors and algorithms as Pre-Planned Product Improvements (P3I). P3I Improvements upgrade JTAGS to a new Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, and improves warning tactical parameters and timeliness. JTAGS Block II is on contract for a two-Phase development effort. JTAGS Block II Phase 1 is complete. JTAGS Block II Phase 2 activities are broken into three spirals to expedite delivering critical capabilities sooner. Phase 2 Spiral 1 and Spiral 2 will be completed in FY 2020.

FY 2021 requested funding of \$9.510 million will allow for the integration of evolving cyber hardening advances, emerging threats, and planning of a JTAGS P3I Block II operational test.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> JTAGS P3I Block II Phase 2	-	-	6.785
<b>Description:</b> Description: JTAGS Block II Phase 2 activities are broken into three spirals to expedite getting critical capabilities fielded sooner. Spiral 1 and 2 are complete. Effort continues on development/integration of evolving cyber hardening advances and emerging threats. (FY 2018-2021). JROC-Memos 197-12 and 113-13 supports the need to develop and field JTAGS Block II capabilities as soon as possible.			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208053A / Joint Tactical Ground System	<b>Project (Number/Name)</b> 635 / Joint Tact Grd Station-P3I(MIP)

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b><i>FY 2021 Plans:</i></b> Allows for the development and integration on evolving cyber hardening advances and emerging threats			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> In FY 2021, funding has been moved from PE 1208053A to PE 0208053A .			
<b><i>Title:</i></b> JTAGS Test and Evaluation Support	-	-	2.725
<b><i>Description:</i></b> Test and evaluation support for the JTAGS P3I Block II program.			
<b><i>FY 2021 Plans:</i></b> Provides test planning support of the JTAGS P3I Block II development program; plan an operational test for JTAGS P3I Block II.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> In FY 2021, funding has been moved from PE 1208053A to PE 0208053A.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	9.510

<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>
• BZ8420: JOINT TACTICAL GROUND STATION MODS (JTAGS)	5.434	-	0.000	-	0.000	-	6.387	-	-	0.000	11.821
• FE7: Joint Tact Grd Station-P3I(MIP)	7.400	7.677	0.000	-	0.000	-	-	-	-	0.000	15.077

**Remarks**  
Beginning in FY21 Joint Tactical Ground System (JTAGS) requested funding has been realigned from PE 1208053A to PE 0208053A to correctly align Major Force Program, National Security Space (MFP 12) resources.

**D. Acquisition Strategy**  
This program element develops critical software intensive improvements, while continuing to make maximum use of Non-Developmental Items (NDI)/Commercial Off-The-Shelf (COTS) components and Government Furnished Equipment (GFE). After design and integration, the system will be subject to thorough developmental and validation/verification testing to verify performance, operational effectiveness and suitability. P3I Improvements will upgrade JTAGS to a new Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, improving warning tactical parameters and timeliness. The acquisition of the

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208053A / <i>Joint Tactical Ground System</i>	<b>Project (Number/Name)</b> 635 / <i>Joint Tact Grd Station-P3I(MIP)</i>

JTAGS Block II effort is being performed under contract W9113M-12-C-0055, awarded 23 Aug 2012. The contract's development efforts are Cost Plus Incentive Fee (CPIF), and the contract's production is Firm Fixed Price (FFP).



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208053A / Joint Tactical Ground System	<b>Project (Number/Name)</b> 635 / Joint Tact Grd Station-P31(MIP)
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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			
Government Program Management	Allot	Various (AMC, AMCOM, CCDC) : Redstone Arsenal, AL	-	-		-		1.184	Oct 2020	-		1.184	0.000	1.184	Continuing
<b>Subtotal</b>			-	-		-		1.184		-		1.184	0.000	1.184	N/A

**Remarks**  
Covers Other Government Agency (OGA) support to the JTAGS acquisition program

<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			
JTAGS P3I Block II Phase 2 Development	Option/ C/PIF	Northrop-Grumman : Colorado Springs, Co	-	-		-		4.401	Oct 2020	-		4.401	0.000	4.401	34.100
System Engineering Support	C/CPFF	COLSA : Huntsville, AL	-	-		-		0.450	Nov 2020	-		0.450	0.000	0.450	Continuing
<b>Subtotal</b>			-	-		-		4.851		-		4.851	0.000	4.851	N/A

**Remarks**  
Completes Development of the JTAGS P3I Block II Phase 2 effort

<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			
System Engineering Technical Assistance	C/CPFF	COLSA : Huntsville, AL	-	-		-		0.750	Nov 2020	-		0.750	0.000	0.750	Continuing
<b>Subtotal</b>			-	-		-		0.750		-		0.750	0.000	0.750	N/A

**Remarks**  
Supports project office in management of the acquisition program

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208053A / Joint Tactical Ground System	<b>Project (Number/Name)</b> 635 / Joint Tact Grd Station-P31(MIP)
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Test and Evaluation (\$ 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			
JTAGS Test Support (ATEC/AIC/JITC)	Allot	Various (ATEC, AIC, JITC) : Various locations	-	-		-		2.725	Oct 2020	-		2.725	0.000	2.725	Continuing
<b>Subtotal</b>			-	-		-		2.725		-		2.725	0.000	2.725	N/A

**Remarks**  
Supports testing of the Phase 2 development effort and a Follow-on Test and Evaluation (FOT&E)

	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	9.510	-	9.510	0.000	9.510	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208053A / Joint Tactical Ground System	<b>Project (Number/Name)</b> 635 / Joint Tact Grd Station-P31(MIP)

Event Name	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
JTAGS P31 Block II Phase 2									[Bar]																			
JTAGS P31 Block II evolving cyber hardening and emerging threats									[Bar]																			
JTAGS P31 Block II operational test planning									[Bar]																			
JTAGS Block III Capability Development Document									[Bar]																			
Post Blk II Emerging Threats and Future Sensor Integration									[Bar]																			
Limited User Test of Post Blk II Emerging Threat Capabilities									[Bar]																			
Pre Blk III Emerging Threats and Future Sensor Integration									[Bar]																			
Limited User Test of of Pre Blk III Emerging Threat Capabilities									[Bar]																			
JTAGS Block III Development Effort									[Bar]																			
									[Bar]																			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0208053A / <i>Joint Tactical Ground System</i>	<b>Project (Number/Name)</b> 635 / <i>Joint Tact Grd Station-P3I(MIP)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
JTAGS P3I Block II Phase 2	1	2021	4	2021
JTAGS P3I Block II evolving cyber hardening and emerging threats	1	2021	4	2021
JTAGS P3I Block II operational test planning	4	2021	4	2021
JTAGS Block III Capability Development Document	4	2021	4	2021
Post Blk II Emerging Threats and Future Sensor Integration	1	2022	2	2023
Limited User Test of Post Blk II Emerging Threat Capabilities	3	2023	3	2023
Pre Blk III Emerging Threats and Future Sensor Integration	4	2023	1	2025
Limited User Test of of Pre Blk III Emerging Threat Capabilities	2	2025	2	2025
JTAGS Block III Development Effort	3	2024	4	2025

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303028A / <i>Security and Intelligence 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	-	40.002	26.749	0.000	23.367	23.367	0.000	0.001	0.000	0.000	0.000	90.119
FG2: <i>Counterintelligence &amp; Human Intel Modernization</i>	-	2.988	1.820	0.000	-	0.000	0.000	0.001	0.000	0.000	0.000	4.809
H13: <i>Information Dominance Center (IDC) - Tiara</i>	-	37.014	24.929	0.000	23.367	23.367	0.000	0.000	0.000	0.000	0.000	85.310

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

The U.S. Army Intelligence and Security Command's (INSCOM) RDTE program provides the Army with low-density, high-demand, extremely advanced offensive cyberspace technologies designed to degrade, deny, disrupt, or destroy adversary Command, Control, Communications, Computers and Intelligence (C4I) and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.

INSCOM conducts RDTE of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, National Security Presidential Directive (NSPD)-38, NSPD-54 and Homeland Security Presidential Directive (HSPD)-23.

HQDA G-2 and the Intelligence and Security Command (INSCOM) Security Operations Center (ISOC) are charged with integrating, informing, and leveraging security and counterintelligence authorities in support of the Department of the Army Insider Threat Program mission to continuously deter, detect, and mitigate insider threats to Army information, networks, facilities, and personnel.

<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	35.476	36.749	37.570	-	37.570
Current President's Budget	40.002	26.749	0.000	23.367	23.367
Total Adjustments	4.526	-10.000	-37.570	23.367	-14.203
• Congressional General Reductions	-	-	-	-	-
• Congressional Directed Reductions	-	-10.000	-	-	-
• Congressional Rescissions	-	-	-	-	-
• Congressional Adds	-	-	-	-	-
• Congressional Directed Transfers	-	-	-	-	-
• Reprogrammings	4.526	-	-	-	-
• SBIR/STTR Transfer	-	-	-	-	-
• Adjustments to Budget Years	-	-	-37.570	23.367	-14.203

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303028A / <i>Security and Intelligence Activities</i>	
<b><u>Change Summary Explanation</u></b> FY 2021 base funding has been realigned to 0607150A / BS5.		

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0303028A / Security and Intelligence Activities				<b>Project (Number/Name)</b> FG2 / Counterintelligence & Human Intel Modernization			
<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>
FG2: Counterintelligence & Human Intel Modernization	-	2.988	1.820	0.000	-	0.000	0.000	0.001	0.000	0.000	0.000	4.809
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

HQDA G-2 and the Intelligence and Security Command (INSCOM) Security Operations Center (ISOC) are charged with integrating, informing, and leveraging security and counterintelligence authorities in support of the Department of the Army Insider Threat Program mission to continuously deter, detect, and mitigate insider threats to Army information, networks, facilities, and personnel.

Funding supports personnel security-related capabilities for identifying, reporting and responding to potential personnel security information of concern. These tools are key enablers of the Army Insider Threat Program. These tools provide statistical models to assess risk, centralized analysis, reporting and response capabilities, and reporting mechanisms for relevant insider threat data.

**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> Insider Threat CE Support	1.722	1.820	-	-	-
<b>Description:</b> HQDA G-2 and the Intelligence and Security Command (INSCOM) Security Operations Center (ISOC) are charged with integrating, informing, and leveraging security and counterintelligence authorities in support of the Department of the Army Insider Threat Program mission to continuously deter, detect, and mitigate insider threats to Army information, networks, facilities, and personnel.					
<b>FY 2020 Plans:</b> Continue personnel security-related capabilities for identifying, reporting and responding to potential personnel security information of concern. These tools are key enablers of the Army Insider Threat Program. These tools provide statistical models to assess risk, centralized analysis, reporting and response capabilities, and reporting mechanisms for relevant insider threat data.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 base funding has been realigned to 0607150A / BS5.					
<b>Title:</b> Classified	0.799	-	-	-	-
<b>Description:</b> Classified					
<b>Title:</b> Identity Intelligence	0.467	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303028A / <i>Security and Intelligence Activities</i>	<b>Project (Number/Name)</b> FG2 / <i>Counterintelligence &amp; Human Intel Modernization</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>
<i><b>Description:</b></i> RDT&E funding supports the development of new software code and associated testing necessary to update an instance of the Identity Intelligence Repository (I2AR) -the unique software-based analytic production system used by intelligence analysts and the National Ground Intelligence Center (NGIC) specifically to create the Biometric Enabled Watchlist for worldwide missions.					
<b>Accomplishments/Planned Programs Subtotals</b>	2.988	1.820	-	-	-

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303028A / Security and Intelligence Activities	<b>Project (Number/Name)</b> FG2 / Counterintelligence & Human Intel Modernization
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<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>	<b>Cost To Complete</b>			
Classified	Various	To Be Determined : To Be Determined	-	0.799		-		-		-		-	0.000	0.799	-	
Insider Threat CE Support	TBD	To Be Determined : To Be Determined	-	1.722		1.820		-		-		-	0.000	3.542	-	
Identity Intelligence	TBD	To Be Determined : To Be Determined	-	0.467		-		-		-		-	0.000	0.467	-	
Counterintelligence Activities	TBD	To Be Determined : To Be Determined	1.825	-		-		-		-		-	0.000	1.825	-	
<b>Subtotal</b>			1.825	2.988		1.820		-		-		-	0.000	6.633	N/A	
<b>Project Cost Totals</b>			1.825	2.988		1.820		-		-		-	0.000	6.633	N/A	

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303028A / <i>Security and Intelligence Activities</i>	<b>Project (Number/Name)</b> FG2 / <i>Counterintelligence &amp; Human Intel Modernization</i>

Event Name	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
Classified	Classified																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303028A / <i>Security and Intelligence Activities</i>	<b>Project (Number/Name)</b> FG2 / <i>Counterintelligence &amp; Human Intel Modernization</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Classified	1	2018	1	2019

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0303028A / Security and Intelligence Activities				<b>Project (Number/Name)</b> H13 / Information Dominance Center (IDC) - Tiara			
<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>
H13: Information Dominance Center (IDC) - Tiara	-	37.014	24.929	0.000	23.367	23.367	0.000	0.000	0.000	0.000	0.000	85.310
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

INSCOM's RDTE program provides the Army with low-density, high-demand, extremely advanced offensive cyberspace technologies designed to degrade, deny, disrupt, destroy, or manipulate adversary C4I and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.

INSCOM conducts RDTE of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, NSPD-38, NSPD-54 and HSPD-23. FY 2020 request includes \$22.9 million for these activities in support of Combatant Command Operations.

**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> Offensive Cyberspace Operations Capability Development	37.014	24.929	0.000	23.367	23.367
<b>Description:</b> INSCOM's RDTE program provides the Army with low-density, high-demand, extremely advanced offensive cyberspace technologies designed to degrade, deny, disrupt, or destroy adversary C4I and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.					
<b>FY 2020 Plans:</b> Continue to develop and support leading-edge Cyberspace technologies designed to exploit, degrade, deny, disrupt, or destroy threat command, control, communications, computers and intelligence (C4I) cyber systems to enable commanders in shaping the operational warfighting environment in order to create conditions favorable to the application of other elements of national power. Support the development of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, Defense Cyber Strategy, Presidential Policy Directive (PPD) 20, National Security Presidential Directive (NSPD) 54, Homeland Defense Presidential Directive (HSPD) 23, and The Army Operating Concept.					
<b>FY 2021 Base Plans:</b>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303028A / <i>Security and Intelligence Activities</i>	<b>Project (Number/Name)</b> H13 / <i>Information Dominance Center (IDC) - Tiara</i>

**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>
<p>Develop and support leading-edge Cyberspace technologies designed to exploit, degrade, deny, disrupt, or destroy threat command, control, communications, computers and intelligence (C4I) cyber systems to enable commanders in shaping the operational warfighting environment in order to create conditions favorable to the application of other elements of national power. Support the development of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, Defense Cyber Strategy, Presidential Policy Directive (PPD) 20, National Security Presidential Directive (NSPD) 54, Homeland Defense Presidential Directive (HSPD) 23, and The Army Operating Concept.</p> <p>INSCOM will address the operational force reports of increasing threat sophistication that requires matching pace in development of offensive capabilities to maintain critical advantage in cyberspace. Expand combatant command focal points in accordance with Secretary of the Army service component commander's emerging needs. The requirement to address NEER-PEER threat actors and army cyberspace operations that are expanding across the cyberspace domain drive the need to reduce development gaps in offensive cyberspace capabilities.</p> <p><b>FY 2021 OCO Plans:</b> Develop and support leading-edge Cyberspace technologies designed to exploit, degrade, deny, disrupt, or destroy threat command, control, communications, computers and intelligence (C4I) cyber systems to enable commanders in shaping the operational warfighting environment in order to create conditions favorable to the application of other elements of national power. Support the development of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, Defense Cyber Strategy, Presidential Policy Directive (PPD) 20, National Security Presidential Directive (NSPD) 54, Homeland Defense Presidential Directive (HSPD) 23, and The Army Operating Concept.</p> <p>INSCOM will address the operational force reports of increasing threat sophistication that requires matching pace in development of offensive capabilities to maintain critical advantage in cyberspace. Expand combatant command focal points in accordance with Secretary of the Army service component commander's emerging needs. The requirement to address NEER-PEER threat actors and army cyberspace operations that are expanding across the cyberspace domain drive the need to reduce development gaps in offensive cyberspace capabilities.</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 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303028A / <i>Security and Intelligence Activities</i>	<b>Project (Number/Name)</b> H13 / <i>Information Dominance Center (IDC) - Tiara</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 base funding has been realigned to 0607150A / BS5.					
<b>Accomplishments/Planned Programs Subtotals</b>	37.014	24.929	0.000	23.367	23.367

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0303028A / Security and Intelligence Activities				H13 / Information Dominance Center (IDC) - Tiara							
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
Mobile Objects/ PHAEDRUS	C/Various	Multiple : Multiple	4.100	-		-		-		-		-	0.000	4.100	-
<b>Subtotal</b>			4.100	-		-		-		-		-	0.000	4.100	N/A
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
Offensice Cyberspace Operations Capability Development	Various	TBD : TBD	105.605	37.014		24.929		0.000		23.367		23.367	Continuing	Continuing	Continuing
<b>Subtotal</b>			105.605	37.014		24.929		0.000		23.367		23.367	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			109.705	37.014		24.929		0.000		23.367		23.367	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303028A / Security and Intelligence Activities	<b>Project (Number/Name)</b> H13 / Information Dominance Center (IDC) - Tiara

Event Name	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
IP-Based Cyber Operations Platforms	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Aerial/Ground-Based Cyber Operations Platforms	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Remote Access Capabilities	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Close Access Capabilities	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Platform C2 and Visualization Capabilities	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Testing and Evaluation Support of Cyberspace RDTE Capabilities	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303028A / <i>Security and Intelligence Activities</i>	<b>Project (Number/Name)</b> H13 / <i>Information Dominance Center (IDC) - Tiara</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
IP-Based Cyber Operations Platforms	1	2019	1	2021
Aerial/Ground-Based Cyber Operations Platforms	1	2019	1	2021
Remote Access Capabilities	1	2019	1	2021
Close Access Capabilities	1	2019	1	2021
Platform C2 and Visualization Capabilities	1	2019	1	2021
Testing and Evaluation Support of Cyberspace RDTE Capabilities	1	2019	1	2021

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / Information Systems Security Program
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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	-	40.148	25.710	29.270	-	29.270	28.828	21.226	18.308	18.677	Continuing	Continuing
491: Information Assurance Development	-	9.787	8.368	8.009	-	8.009	7.596	7.638	7.593	7.993	Continuing	Continuing
DV4: Key Management Infrastructure (KMI)	-	2.702	11.687	13.457	-	13.457	13.339	5.408	2.475	2.398	Continuing	Continuing
DV5: Crypto Modernization (Crypto Mod)	-	5.943	5.655	7.804	-	7.804	7.893	8.180	8.240	8.286	Continuing	Continuing
ET9: Embedded Crypto Modernization (CRYPTO MOD)	-	20.745	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	20.745
FF8: Unit Activity Monitoring (UAM)	-	0.971	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.971

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

The Information Systems Security Program funding line supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

Project 491: Army CIO/G6 manages Project 491

Project 491: Information Assurance (IA) Development supports the implementation of the National Security Agency (NSA) developed Communications Security (COMSEC) technologies within the Army by providing COMSEC system capabilities through encryption, trusted software or standard operating procedures, and integrating these mechanisms into specific systems in support of securing the Army Tactical and Enterprise Networks. This entails architecture studies, system integration and testing, developing installation kits, and certification and accreditation of Automation Information Systems. The program assesses, develops and integrates Cyber Security (CS)/COMSEC tools (hardware and software) which provide protection for fixed infrastructure post, camp and station networks as well as tactical networks. The cited work is consistent with Strategic Planning Guidance (SPG) and the Army Modernization and Strategy Plan (AMSP).

IA Development funding implements and establishes functional and technical boundaries of cryptographic, key management and IA capabilities in coordination with the NSA, the DISA, and Joint Services, to secure National Security Systems (NSS), and National Security Information (NSI). Technical evaluations assess the security, operational effectiveness and network interoperability of advanced concept technologies to develop policies, standards, and fundamental building blocks for Army COMSEC capabilities that reduce the risk of future material solutions that could underperform and disrupt classified operations. Develop and publish the COMSEC Implementation Planning Guidance to identify, standardize, and govern the insertion of CS capabilities to bridge operational gaps and support the DoD and NSA mandated requirements to enhance network capacity while providing for secure information exchange of voice, video, and data in accordance with the Army Network

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	
<p>Campaign Plan. This will be accomplished by interoperability evaluation, standards testing, and CS, System of System Network Vulnerability Assessments (SoS NVA) for Army Capability Sets for CS/COMSEC capabilities that provide protections for tactical and fixed infrastructure post, camp, and station networks.</p> <p>Project 491 FY 2021 Justification: This funding supports the continuation of providing oversight for the executions of the Army's COMSEC Modernization initiatives including major ACC updates and replacements of existing devices and systems to meet NSA mandates. Continue to support the evaluation and testing of new technologies for Army implementation in support of CM2, KMI migration and S-ICAN/ITN architecture implementation. Support efforts to provide updated end-to-end, tactical-to-strategic COMSEC standardization and implementation guidance to meet Army's operational requirements. to assess new key management technologies developed by DoD joint KMI program to determine the maturity for Army fielding to protect and strengthen the Army Network posture. and to work with DoD CIO, NSA, DISA and other Services to resolve cryptographic interoperability issues for both embedded and standalone systems and performed risk reduction testing of commercial products prior to insertion into Army for use to increase operational availability with documented operational value and rapid integration. Provide timely test and evaluate results to enable the Army to make sound investment strategic decisions and to reduce or eliminate duplications. Also supports efforts to update and develop policies to posture Army's operations to implement innovative cryptographic and key management tools and services. and to participate in DoD and Army working groups to develop plans for CM2 implementation. Perform System of System Network Vulnerability Assessments (SoS NVA) to provide protections for the Army Integrated Tactical Networks.</p> <p>The Defensive Cyberspace Operations (DCO) program provides initial capabilities that enable passive and active cyberspace defense operations to preserve friendly cyberspace capabilities and protect data, networks, net-centric capabilities, and other designated systems. Big Data Pilot provides an advanced analytics capability capable of ingesting structured, semi-structured, and unstructured data from multiple data sources (e.g., Joint Regional Security Stacks (JRSS), intrusion detection systems, intrusion prevention systems, network device log files, trouble tickets, firewalls, proxies, web and applications server log files, etc) and proves situational awareness of cyberspace battlefield. It provides the computer network defense provider with common analytic platform which informs and reduces risk associated with future material solutions and forms a blueprint for future Big Data Analytics. Big Data (analysis-of-all DoD Information Network sensor data) provides two optimized and accredited clusters deployed in support of JRSS and Defense Research and Engineering Network (DREN) with a tools suite accessible to Cyber Mission Forces via secure remote access. The Army's DCO activities are a construct of active cyberspace defenses which provide synchronized, real-time capability to discover, detect, analyze, and mitigate threats to and vulnerability of DoD networks and systems.</p> <p>Project DV4 &amp; DV5: COMSEC is governed by the Chairman of the Joint Chiefs of Staff Instruction (CJCSA) 6510. In order to ensure Warfighters continue to have secured communications (i.e., encrypted data and voice), Army communications systems are required to support modern cryptographic capabilities by implementing modern algorithms. These efforts are consistent with Strategic Planning Guidance (SPG). These funding lines support the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.</p> <p>Project DV4: The Army Key Management Infrastructure (AKMI) is the Army's implementation of the National Security Agency (NSA) KMI ACAT IAM program, automating the functions of COMSEC electronic key management, control, planning, and distribution. AKMI supports the Army's ability to communicate and distribute Cryptographic data on the Army's tactical and strategic networks by limiting adversarial access to and reducing the vulnerability of, Army Command, Control, Communications, Computers, Cyber, Intelligence (C5I) systems. AKMI devices receive, store, manage, and transfer electronic key through the network to be loaded</p>		

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>
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into communication devices such as radios and satellites to secure the network. Without this technology Warfighters are required to manually receive their cryptographic products by traveling to COMSEC account locations (which may not be co-located) and manually fill their devices.

Project DV4 FY 2021 Justification: This funding line supports COMSEC technologies within the Army with allocations for the following: \$1M, Reprogrammable Single Chip Universal Encryptor (RESCUE) to create a secure, reprogrammable cryptographic engine in providing Cryptographic Modernized Capabilities including future Over the Network Keying (OTNK) to Fill Devices and End Cryptographic Units (ECUs); \$12.346M to perform the systems integration and UAS development for the Next Generation Load Device - Medium (NGLD-M) to conduct the Army's key fill mission by issuing, filling, and managing Cryptographic keys to both legacy and future KMI aware End-Cryptographic Units (ECUs). This technology requires RDT&E investment to meet the requirements outlined in the NGLD Capability Production Document (CPD). This effort an Acquisition Category III (ACAT III) Program of Record (POR); \$0.111M to Program Management Support, funds a matrixed Acquisition Program Manager (APM) from Combat Capabilities Development Command (CCDC) Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center to manage the NGLD-M development effort.

Project DV5: Crypto Modernization (Crypto Mod) performs test, evaluation, development, and configuration management for cryptographic devices that receive key through fill devices and allow for secure communication through Army devices such as radios and satellite terminals. This program utilizes National Security Agency (NSA) developed Communications Security (COMSEC) technologies within the Army providing encryption, trusted software, or standard operating procedures, and integrating these mechanisms into specified systems in support of securing the Army Tactical and Enterprise Networks. The effort supports network operations from end-to-end throughout the force and the Common Operating Environment (COE) thus mitigating networked vulnerabilities to Army information security systems. In order to ensure Warfighters continue to have secured communications (i.e., encrypted data and voice), Army communications systems are required be upgraded to modern algorithms to meet emerging threat developed by our adversaries. Crypto Modernization necessitates the utilization of the latest NSA cryptographic capabilities in order to defeat adversarial efforts to decrypt, disrupt, or exploit US Army networks. COMSEC is the Army's implementation of NSA protections to create a unified network that is protected, resilient, and survivable.

Project DV5 FY 2021 Justification: The program continues testing and evaluation of COMSEC devices to confirm capability and interoperability on Army networks and tactical systems as well as identifying risk areas for compliance with COMSEC regulations and procedures. The program will test and evaluate Crypto Systems compliant devices, Suite B IPsec devices built on commercial standards, Cryptographic High Value Product (CHVP), Commercial Solutions for Classified (CSfC) Guidance, and new software releases to High Assurance Internet Protocol Encryptor (HAiPE) 4.X devices in accordance with AR 700-142 Revision dated 8 June 2018. The program tests interoperability and provides ways to insert Data At Rest (DAR) and Data In Transit (DIT) technology within the existing and future network infrastructure. Additionally, this program evaluates performance of technologies and provides direction to ensure the lowest impact on performance while providing the greatest protection from loss of sensitive data.

Project ET9: Embedded Cryptographic Modernization Initiative (ECMI) program was canceled FY 2018. No FY 2021 funding is requested.

Project FF8: User activity monitoring (UAM) automation/analytics will provide technical capability to enhance Army UAM analysis effectiveness and efficiency. The UAM mission is to observe and record the actions and activities of an individual, at any time, on any device accessing Army information on classified networks in order to detect insider threats and to support authorized investigations. Army UAM is a component of the Army Insider Threat (InT) Program. Army's InT Program and UAM are

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>
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conducted in accordance with the National Defense Authorization Act for Fiscal Year 2012, section 922., Insider Threat Detection; Presidential Memorandum, National Insider Threat Policy and Minimum Standards for Executive Branch Insider Threat Programs, dated 21 November 2012; Executive Order 13587, Structural Reforms to Improve the Security of Classified Networks and the Responsible Sharing and Safeguarding of Classified Information, (Reference b) dated 7 October 2011, and Army Directive 2013-18 (Army Insider Threat Program), 31 July 2013. Innovative enhancements are required to improve UAM analysis productivity, data visualization, and workflow management. The analysis productivity objective is to develop and implement user behavior models that use UAM and other network data to identify anomalous user behavior over time, and to integrated new data sources into the UAM analytical data store and processing system. Data visualization advances will present UAM analysts behavior model processing results in an intuitive format that reduce the time required to review the results. Workflow management improvements will add new capabilities to the UAM workflow management system with the objective of enhancing analysis reporting productivity and metrics collection.

<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	42.520	29.185	29.299	-	29.299
Current President's Budget	40.148	25.710	29.270	-	29.270
Total Adjustments	-2.372	-3.475	-0.029	-	-0.029
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-3.475			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.372	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.029	-	-0.029

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>				<b>Project (Number/Name)</b> 491 / <i>Information Assurance 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>
491: <i>Information Assurance Development</i>	-	9.787	8.368	8.009	-	8.009	7.596	7.638	7.593	7.993	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

PE 0303140A, project 491 includes funding for the Army CIO/G6 and Project Lead (PL) Enterprise Services (ES).

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

Project 491: Information Assurance (IA) Development supports the implementation of National Security Agency (NSA) developed Communications Security (COMSEC) technologies within the Army enterprise and tactical networks by ensuring COMSEC devices/systems are cryptographically interoperable and standard based. This entails architecture studies, technology assessments, secured devices testing, system integration and installation kits development to provide protections for fixed infrastructure post, camps and station networks as well as tactical networks. The cited work is consistent with Army's Mission Command Implementation Plan LOE 1, Network Enable Functions.

IA Development funding Implements, establishes functional and technical boundaries of cryptographic, key management and IA capabilities In Coordination With (ICW) the NSA, the Defense Information Systems Agency (DISA), and Joint Services, to secure National Security Systems (NSS), and National Security Information (NSI). Technical evaluations assess the security, operational effectiveness and network interoperability of advanced concepts/technologies to develop policies, standards, and fundamental building blocks for Army COMSEC capabilities that reduce the risk of future materiel solutions that could underperform and disrupt classified operations.

Develop and publish COMSEC Implementation Planning Guidance to identify, standardize, and govern the insertion of IA capabilities that will bridge operational gaps and support the DoD and NSA mandated requirements to enhance network capacity while providing secure information exchange of voice, video, and data IAW the Army Network Campaign Plan. This will be accomplished by interoperability test and evaluation, standards development, and System of System Network Vulnerability Assessments (SoS NVA) to provide protections for the Army Integrated Tactical Networks.

**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> Oversight and implementation guidance of emerging Cryptographic and CS capabilities to ensure interoperability to maintain compliance with DoD, NSA, and Army policies and regulations. (CIO/G6)	9.787	8.368	8.009	-	8.009
<b>Description:</b> The program provides oversight and guidance for technical research and evaluation of Cryptographic Modernization (CM) and Key Management (KM) capabilities to ensure IA compliance and interoperability. This effort improves operational effectiveness, ensures efficient implementation, and enhances network performance by deploying standardized COMSEC capabilities that are interoperable and supportable in					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> 491 / <i>Information Assurance Development</i>

**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>
<p>Army, coalition and Joint operating environments. This program enables the Army to collaborate and participate in Joint and Army Capability Technology Demonstrations to define, improve, develop and publish Cyber Security (CS) standards for new/modernized technology insertion to support the LWN 2025 and Beyond. This effort assesses and defines risk mitigation of CS network vulnerabilities in end-to-end Army network operations and Common Operating Environment. (CIO/G6)</p> <p><b>FY 2020 Plans:</b> Continue to provide oversight for the executions of the Army's COMSEC Modernization initiatives. Identify and evaluate new CM, TRANSEC and KM technologies for Army implementation in support of ACC updates, KMI migration and S-ICAN/ITN architecture development. Develop end-to-end, tactical-to-strategic COMSEC standardization to meet Army's operational requirements. Test and assess CM and KM technologies to determine the maturity and viability for Army use to protect and strengthen the Army Network posture. Document new fundamental building blocks for IA solutions, perform risk reduction testing of commercial products prior to insertion into Army for use to increase operational availability with documented operational value and rapid integration. Collaborate with the NSA, DoD CIO and Joint Staff to continue to support the ACC device testing and fielding. Provide timely test and evaluate results to enable the Army to make sound investment strategic decisions and to reduce or eliminate duplications. Participate in operational assessment of NSA, DoD, Joint Staff and Service led Joint Capability Technology Demonstrations to align new technologies to documented Army and Service capability gaps and requirements for protecting National Security Systems and National Security Information. Develop strategies and policies to posture Army's operations to implement innovative cryptographic and key management tools and services. Continue to support DoD CM2 efforts.</p> <p><b>FY 2021 Base Plans:</b> Will continue to provide oversight for the executions of the Army's COMSEC Modernization initiatives including major ACC updates and replacements of existing devices and systems. Continue to evaluate and test new technologies for Army implementation in support of CM2, KMI migration and S-ICAN/ITN architecture implementation. Continue to provide updated end-to-end, tactical-to-strategic COMSEC standardization and implementation guidance to meet Army's operational requirements. Continue to assess new key management technologies developed by DoD joint KMI program to determine the maturity for Army fielding to protect and strengthen the Army Network posture. Continue to work with DoD CIO, NSA, DISA and other Services to resolve cryptographic interoperability issues for both embedded and standalone systems and performed risk reduction testing of commercial products prior to insertion into Army for use to increase operational availability with documented operational value and rapid integration. Provide timely test and evaluate results to enable</p>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> 491 / <i>Information Assurance Development</i>

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
the Army to make sound investment strategic decisions and to reduce or eliminate duplications. Participate in operational assessment of NSA, DoD, Joint Staff and Service led Joint Capability Technology Demonstrations to align new technologies to documented Army and Service capability gaps and requirements for protecting National Security Systems and National Security Information. Continue to update and develop policies to posture Army's operations to implement innovative cryptographic and key management tools and services. Participated in DoD and Army working groups to develop plans for CM2 implementation. Perform System of System Network Vulnerability Assessments (SoS NVA) to provide protections for the Army Integrated Tactical Networks.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> \$351K decrease from FY 2020 to FY 2021.					
<b>Accomplishments/Planned Programs Subtotals</b>	9.787	8.368	8.009	-	8.009

**C. 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>
• DV5: <i>Crypto Modernization (Crypto Mod)</i>	5.943	5.655	7.804	-	7.804	7.893	8.180	8.240	8.286	Continuing	Continuing
• ET9: <i>Embedded Crypto Modernization (CRYPTO MOD)</i>	20.745	-	0.000	-	0.000	-	-	-	-	0.000	20.745
• B96002: <i>CRYPTOGRAPHIC SYSTEMS (CRYPTO SYS)</i>	26.350	66.242	81.028	0.128	81.156	52.344	52.721	52.168	65.355	0.000	396.336
• B96006: <i>Embedded Cryptographic Modernization</i>	3.520	-	0.000	-	0.000	-	-	-	-	0.000	3.520
• BS9716: <i>NON PEO-SPARES</i>	3.131	3.857	3.896	-	3.896	3.935	3.936	3.996	3.996	0.000	26.747

**Remarks**

**D. Acquisition Strategy**

The objective of the Cryptographic Systems program is to provide adaptive, flexible, and programmable cryptographic solutions using best practices, lessons learned and programmatic management to meet the challenge of modernizing the Army's aging cryptographic systems. Associated documents include CDD, approved by CIO/ G6, 15 Jul 2010; ICD, approved by JROC, 25 Mar 2011; AAO; approved by G3, 15 Dec 2011 and revised and approved, 19 Jun 2015.



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> 491 / <i>Information Assurance 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			
System Engineering (PL Net E)	SS/LH	CECOM RDEC : CECOM RDEC APG, MD	81.783	-		-		-		-		-	0.000	81.783	-
Big Data Pilot (PL ES-CYBER)	TBD	TBD : FT BELVOIR, VA	9.725	-		-		-		-		-	0.000	9.725	-
Information Assurance System Engineering Support (PL Net E)	C/FFP	DSCI Consulting : APG, MD	7.106	-		-		-		-		-	0.000	7.106	-
Engineering Support (PL Net E)	C/CPFF	CACI : APG, MD	5.018	-		-		-		-		-	0.000	5.018	-
Engineering Support (PL Net E)	C/CPFF	Booz Allen Hamilton : APG, MD	3.408	-		-		-		-		-	0.000	3.408	-
Engineering Support (PL Net E)	C/FP	CSC : APG, MD	16.448	-		-		-		-		-	0.000	16.448	-
<b>Subtotal</b>			123.488	-		-		-		-		-	0.000	123.488	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 Support (PL Net E)	C/CPFF	TBD : TBD	1.598	-		-		-		-		-	0.000	1.598	-
Engineering Support (CIO/G-6)	C/FP	CACI : APG, MD	8.629	3.734		3.500	Oct 2019	3.400	Oct 2020	-		3.400	0.000	19.263	-
System Engineering (CIO/G-6)	SS/LH	AFC C5ISR : APG, MD	6.353	3.242		2.297	Oct 2019	2.189	Oct 2020	-		2.189	0.000	14.081	-
Engineering Support (CIO/G-6)	C/CPFF	Booz Allen Hamilton : APG, MD	9.186	1.579		1.355	Oct 2019	1.350	Oct 2020	-		1.350	0.000	13.470	-
Engineering Support (CIO/G-6)	C/FFP	AASKI : Edgewood, MD	5.240	1.232		0.400	Oct 2019	0.500		-		0.500	0.000	7.372	-
Service (CIO-G-6)	SS/LH	ARL/SLAD : White Sand Missile Range (WSMR)	7.051	-		0.816	Oct 2019	0.570	Oct 2020	-		0.570	0.000	8.437	-

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>											<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0303140A / Information Systems Security Program					<b>Project (Number/Name)</b> 491 / Information Assurance Development					
<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>			
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>			38.057	9.787		8.368		8.009		-		8.009	0.000	64.221	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>			161.545	9.787	8.368	8.009	-	8.009	0.000	187.709	N/A				

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> 491 / <i>Information Assurance Development</i>	

Event Name	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
TECHNOLOGY TEST & EVALUATION (CIO/G6)																												
DEFINE SECURITY & INTEROPERABILITY STANDARDS (CIO/G6)																												
COMSEC STRATEGY & CRYPTO TECHNOLOGY ROADMAP (CIO/G6)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> 491 / <i>Information Assurance Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
TEST & EVALUATION OF CRYPTOGRAPHIC SYSTEMS (PL Net E)	1	2014	4	2014
STUDY OF CURRENT AND EMERGING CRYPTO ALGORITHMS AND TECHNOLOGIES (PL Net E)	1	2015	2	2015
TEST OF INE AND WIRELESS SOLUTION (PL Net E)	1	2016	4	2018
BIG DATA PILOT (PD ES-CYBER)	1	2016	4	2016
TECHNOLOGY TEST & EVALUATION (CIO/G6)	1	2017	4	2023
DEFINE SECURITY & INTEROPERABILITY STANDARDS (CIO/G6)	1	2017	4	2023
COMSEC STRATEGY & CRYPTO TECHNOLOGY ROADMAP (CIO/G6)	1	2014	4	2023

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>					<b>Project (Number/Name)</b> DV4 / <i>Key Management Infrastructure (KMI)</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>
DV4: <i>Key Management Infrastructure (KMI)</i>	-	2.702	11.687	13.457	-	13.457	13.339	5.408	2.475	2.398	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This funding line supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

Communications Security (COMSEC) is governed by the Chairman of the Joint Chiefs of Staff Instruction (CJCSA) 6510. In order to ensure Warfighters continue to have secured communications (i.e., encrypted data and voice), Army communications systems are required to support modern cryptographic capabilities by implementing modern algorithms.

As part of the Army's Key Management Infrastructure (KMI) implementation, the Next Generation Load Device - Medium (NGLD-M) is an Acquisition Category III (ACAT III) Program of Record (POR) and modernized load device that will replace approximately 144,000 legacy AN/PYQ-10A and AN/PYQ-10A(C) (Army), which is commonly referred to as the Simple Key Loader (SKL). The NGLD-M will receive, store, manage, and transfer electronic key through the network to be loaded into communication devices such as radios and satellites to secure the network. The SKL has been in the field for 14 years and does not support modernized network concepts and faces battery life attrition among early versions of the device. The NGLD-M will fulfill the current and modernized Army network concepts which will improve operational readiness, adaptiveness, and survivability of the Warfighters supporting the COMSEC requirements for approximately 1.5 million End Cryptographic Units (devices that consume cryptographic key to enable encrypted communication such as a radio or secure phone). The NGLD-M requires RDT&E investment to develop and test the hardware and software solutions to meet the operational requirements outlined in the NGLD Capability Production Document (CPD) to modernize fill devices with capability to transfer and receive cryptographic key over a network to reduce causalities and maintain mission OPTEMPO. Without this technology Warfighters are required to manually receive their cryptographic products by traveling to COMSEC account locations (which may not be co-located) and manually filling their devices.

The Reprogrammable Single Chip Universal Encryptor (RESCUE) is a government owned reprogrammable cryptographic chip that incorporates KMI functionality and modern algorithms to encrypt and decrypt messages for the embedding. This chip could be adapted for use within the NGLD-M or any other cryptographic communications system.

**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> Reprogrammable Cryptographic Chip Development and Evaluation	1.408	1.000	1.000	-	1.000
<b>Description:</b> The Reprogrammable Single Chip Universal Encryptor (RESCUE) is a reprogrammable cryptographic chip that incorporates KMI functionality and modern algorithms to encrypt and decrypt messages					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> DV4 / <i>Key Management Infrastructure (KMI)</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>for the embedding device. The RESCUE is built upon a modular architecture to enable tailoring of the chip to meet the specific requirements of the embedding device. This effort creates a government owned potential universal cryptographic chip enabling the Army to decrease costs for encryption devices.</p> <p><b>FY 2020 Plans:</b> The follow-on RESCUE technology will continue through end of FY 2020.</p> <p><b>FY 2021 Base Plans:</b> The RESCUE effort will consist of maintaining lab equipment, embedment planning to utilize the RESCUE chip with new capabilities, requirements analysis, tracking part's obsolescence, and software/firmware baseline development.</p>					
<p><b>Title:</b> NGLD Medium Development and NSA Certification</p> <p><b>Description:</b> The Next Generation Load Device - Medium (NGLD-M) will conduct the Army's key fill mission by issuing, filling, and managing Cryptographic keys to both legacy and future KMI aware End-Cryptographic Units (ECUs). This technology requires RDT&amp;E investment to meet the requirements outlined in the NGLD Capability Production Document (CPD).</p> <p><b>FY 2020 Plans:</b> Contract Award for NGLD-M development, production, and sustainment. Conduct requirements review in preparation of System Requirements Review (SRR). Initialize development environment between Navy and Development contractor.</p> <p><b>FY 2021 Base Plans:</b> Support NGLD-M system integration and the User Application Software (UAS) which is a graphical interface that will allow users to interact with the device. The NGLD-M development will establish configuration items and allocate system functions and performance requirements to the configurations items through a Preliminary Design Review. Further NGLD-M development will finalize the physical and functional characteristics of the NGLD-M configuration items and establish Government configuration control of the design at the Critical Design Review (CDR). At CDR, The Government will receive pre-production development models to support Highly Accelerated Life Testing for system reliability testing, End Cryptographic Unit interoperability testing, and the Risk Management Framework Security Control Assessment.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>	-	10.578	12.346	-	12.346

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> DV4 / <i>Key Management Infrastructure (KMI)</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 increase of \$1.768M to provide for a full 12 months of support for increased requirements to deliver pre-production development models.					
<p><b>Title:</b> Acquisition Planning and Risk Mitigation</p> <p><b>Description:</b> The Milestone Decision Authority issued a Materiel Development Decision (MDD) Acquisition Decision Memorandum (ADM) on 14 March 2019 that authorized execution of FY 2019 RDT&amp;E funds for acquisition planning and risk mitigation. The Naval Information Warfare Systems Command (NAVWARSSYSCOM) will be conducting requirements analysis for the System Requirements Document (SRD); completing traceability of requirements from the Capability Production Document (CPD) to the SRD to software functionality; defining software architecture from the derived requirements and soliciting user feedback on software workflows in order to ensure a seamless transition into development with the contract award in FY 2020.</p>	1.250	-	-	-	-
<p><b>Title:</b> Program Management Support</p> <p><b>Description:</b> PMO costs will be covered by OMA funding. This funds a matrixed Acquisition Program Manager (APM) from Combat Capabilities Development Command (CCDC) Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center to manage the NGLD-M development effort.</p> <p><b>FY 2020 Plans:</b> FY 2020 funds a matrixed Acquisition Program Manager (APM) from Combat Capabilities Development Command (CCDC) Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center to manage the NGLD-M development effort.</p> <p><b>FY 2021 Base Plans:</b> FY 2021 funds a matrixed Acquisition Program Manager (APM) from Combat Capabilities Development Command (CCDC) Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center to manage the NGLD-M development effort.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase of \$.002 due to inflation.</p>	-	0.109	0.111	-	0.111
<p><b>Title:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun</p> <p><b>Description:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun</p>	0.044	-	-	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> DV4 / <i>Key Management Infrastructure (KMI)</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>
<b>Accomplishments/Planned Programs Subtotals</b>	2.702	11.687	13.457	-	13.457

**C. 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>
• B96004: <i>KEY MANAGEMENT INFRASTRUCTURE</i>	35.710	80.855	78.244	-	78.244	79.690	93.560	96.484	97.115	0.000	561.658
• OMA - 153140: <i>ISSP (TSEC-AKMS)</i>	-	-	-	-	-	-	-	-	-	-	-

**Remarks**

Line Item & Title:  
 B96004: Key Management Infrastructure (OPA2)  
 153140: ISSP (TSEC-AKMS) (OMA)

**D. Acquisition Strategy**

Aspects of the Next Generation Load Device - Medium (NGLD-M) may include commercially availability solutions and/or interfaces, but development is required to integrate these solutions into a device that meets the rigors of NSA Type 1 certification and the Capability Production Document (CPD) requirements. There is no commercially driven market for Type-1 certified load devices that meet the requirements identified in the NGLD Family CPD. These requirements ensure secure communications by requiring the NGLD-M to provide specific tamper protections, limit electromagnetic radiation to prevent adversarial detection of the system, among others outlined within the Information Assurance Security Requirements Document. The NGLD-M acquisition also supports organic development of the User Application Software to reduce the life-cycle sustainment for the system.

Army Key Management Infrastructure (AKMI) consists of Programs of Record (POR) as well as Non PORs under Project Lead Network Enablers (PL Net E). AKMI is the Army's implementation of the National Security Agency (NSA) Key Management Infrastructure (KMI) ACAT IAM Program of Record. The AKMI will allow the Army to manage, control, plan, and distribute electronic key for the ~1.5 million End Cryptographic Units (ECU)s necessary to communicate and distribute data on the Army's tactical and strategic networks such as radios, secure phones, and satellite terminals.

AKMI initial Army Acquisition Program Baseline (APB) was approved 2QFY12. The AKMI Program will include the Management Clients (MGC) nodes, Automated Communications Engineering Software (ACES) and Next Generation Load Device (NGLD) Family.

The NGLD family of devices will become the primary Army Tier 3 component of the AKMI Program. The NGLD CPD calls for a family of 3 devices (small, medium and large) to meet the AKMI requirements. The AKMI program has partnered with Combat Capabilities Development Command (CCDC) Command, Control, Computers,



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> DV4 / <i>Key Management Infrastructure (KMI)</i>
<p>Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center to develop a KMI compliant cryptographic engine, the government owner Reprogrammable Single Chip Universal Encryptor (RESCUE) that can be utilized by NGLD-M or other COMSEC devices. The NGLD-M will undergo full-and-open competition for development, production, and sustainment with a projected FY20 award. NGLD-M development will be conducted during FY19-22 culminating in NSA certification and an operational event.</p> <p>The Milestone Decision Authority issued a Materiel Development Decision (MDD) Acquisition Decision Memorandum (ADM) on 14 March 2019 that designated the NGLD-M as an ACAT III Program of Record (PoR) and authorized execution of Fiscal Year 2019 RDT&amp;E funds for acquisition planning and risk mitigation.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0303140A / Information Systems Security Program				DV4 / Key Management Infrastructure (KMI)							
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
FY 2018 NDAA SEC 825 MDAP Cost Overrun	SS/CR	APG, MD : APG, MD	-	0.044		-		-		-		-	0.000	0.044	-
<b>Subtotal</b>			-	0.044		-		-		-		-	0.000	0.044	N/A
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
KMI Awareness (RESCUE Development and NSA Certification)	C/CPFF	Dynamics Research Corporation/Engility : APG, MD	13.037	1.408	Nov 2018	1.000	Jul 2020	1.000	Jul 2021	-		1.000	Continuing	Continuing	Continuing
KMI Awareness	C/CPFF	CCDC C5ISR, S&TCD : APG, MD	1.451	-		-		-		-		-	0.000	1.451	-
NGLD Development	C/CPFF	CCDC C5ISR S&TCD; NAVWARSYSCOM : APG, MD; San Diego, CA; TBD	-	1.250		10.578	Nov 2019	12.346	Nov 2020	-		12.346	Continuing	Continuing	Continuing
<b>Subtotal</b>			14.488	2.658		11.578		13.346		-		13.346	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
Program Management Support	C/CPFF	CCDC C5ISR S&TCD : APG, MD	-	-		0.109	Nov 2019	0.111	Nov 2020	-		0.111	0.000	0.220	-
<b>Subtotal</b>			-	-		0.109		0.111		-		0.111	0.000	0.220	N/A
<b>Project Cost Totals</b>			14.488	2.702		11.687		13.457		-		13.457	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>							<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 2040 / 7			<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>			<b>Project (Number/Name)</b> DV4 / <i>Key Management Infrastructure (KMI)</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-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> DV4 / <i>Key Management Infrastructure (KMI)</i>

Event Name	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
Reprogrammable Cryptographic Chip Development (RESCUE)	[Blue bar spanning all quarters from FY 2019 to FY 2025]																											
NGLD-M Testing	[Blue bar spanning quarters 1-4 of FY 2022]																											
NGLD-M Development	[Blue bar spanning quarters 2-4 of FY 2019 and quarters 1-4 of FY 2020]																											
NGLD-M Milestone B	[Blue triangle '2' in quarter 2 of FY 2020]																											
NGLD-M Development, Production, Sustainment Contract	[Blue bar spanning quarters 2-4 of FY 2020 and quarters 1-4 of FY 2021]																											
NGLD-M Follow-On Production and Sustainment Contract	[Blue bar spanning quarters 1-4 of FY 2024]																											
NGLD-M Simplified Acquisition Management Plan	[Blue triangle '1' in quarter 3 of FY 2019]																											
NGLD-M Milestone C	[Blue triangle '3' in quarter 3 of FY 2023]																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> DV4 / <i>Key Management Infrastructure (KMI)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Reprogrammable Cryptographic Chip Development (RESCUE)	1	2019	4	2026
NGLD-M Testing	1	2022	4	2023
NGLD-M Development	2	2019	4	2023
NGLD-M Milestone B	3	2020	3	2020
NGLD-M Development, Production, Sustainment Contract	3	2020	4	2024
NGLD-M Follow-On Production and Sustainment Contract	4	2024	4	2028
NGLD-M Simplified Acquisition Management Plan	4	2019	4	2019
NGLD-M Milestone C	3	2023	3	2023

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>				<b>Project (Number/Name)</b> DV5 / <i>Crypto Modernization (Crypto Mod)</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>
DV5: <i>Crypto Modernization (Crypto Mod)</i>	-	5.943	5.655	7.804	-	7.804	7.893	8.180	8.240	8.286	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Project DV5, Crypto Modernization (Crypto Mod), supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy. Communications Security (COMSEC) is governed by the Chairman of the Joint Chiefs of Staff Instruction (CJCSA) 6510.

Crypto Mod performs test, evaluation, development, and configuration management for cryptographic devices that receive key through fill devices and allow for secure communication through Army devices such as radios and satellite terminals. In order to ensure Warfighters continue to have secured communications (i.e., encrypted data and voice), Army communications systems are required be upgraded to modern algorithms to meet emerging threat developed by our adversaries. Crypto Modernization necessitates the utilization of the latest National Security Agency (NSA) cryptographic capabilities in order to defeat adversarial efforts to decrypt, disrupt, or exploit US Army networks. Communications Security (COMSEC) is the Army's implementation of NSA protections to create a unified network that is protected, resilient, and survivable.

To accomplish this multi-faceted effort, consistent with Strategic Planning Guidance and the Army Modernization and Strategy Plan, Crypto Mod performs evaluation of emerging threats, development of advances protections to defeat these threats, testing of commercial and government off the shelf applications developed to provide protections against identified threats, and assessment of new software and hardware updates to these end user devices and software to ensure they remain hardened against cyber-attack. This ensures that all endpoints from singular NIPRNET, SIPRNET, JWICS and Intelligence workstations in the strategic Enterprise to Tactical vehicles and equipment utilized by dismounted personnel forward deployed in hot zone are protected when processing the critical mission and voice data that provides the strategic overmatch required to accomplish the Army's mission.

**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> VINSON/ANDVT (Advanced Narrowband Digital Voice Terminal) Cryptograph Modernization (VACM) program	0.625	0.746	0.300	-	0.300
<b>Description:</b> This program researches, assesses, tests, plans and works to integrate VACM products for the Army. These are a critical voice communications asset utilized for the president's air wing. The VACM program is a NSA mandated program established to replace legacy external cryptographic devices such as the KY-57, KY-99A, KY-58, KY-99, KY-100 and CV- 3591 / KYV-5. In order to ensure the confidentiality, integrity and availability of classified communications, the cryptographic modules must be tested for interoperability and					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> DV5 / <i>Crypto Modernization (Crypto Mod)</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>form fit to ensure a successful fielding. Each software release will require testing to insure comparability and interoperability.</p> <p><b>FY 2020 Plans:</b> The program will continue to test and evaluate any engineering changes to Full Rate Production (FRP) of VACM devices to confirm continued capability and interoperability on Army networks and tactical systems as well as identifying new risk areas for compliance with COMSEC regulations and procedures. The program will continue fielding, performing site surveys and installing at both CONUS and OCONUS locations.</p> <p><b>FY 2021 Base Plans:</b> The program will continue to test and evaluate new software update to VACM devices to confirm continued capability and interoperability on Army networks and different tactical platforms as well as identifying new risk areas for compliance with COMSEC regulations and procedures. Development activities are ongoing as programs continue fielding, performing site surveys and installing at both CONUS and OCONUS locations.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 decrease of \$.446M due to the completion of FRP testing in FY 2020.</p>					
<p><b>Title:</b> Cryptographic Systems Test and Evaluation</p> <p><b>Description:</b> This program supports the Army Cryptographic Modernization Transformational Initiative. This is accomplished by providing test and evaluation capabilities to the COMSEC community in order to assess emerging technologies before being released and approved for Army use; testing will be performed on hardware, software and network systems.</p> <p><b>FY 2020 Plans:</b> The program will continue the testing and evaluation of COMSEC devices to confirm capability and interoperability on Army networks and tactical systems as well as identifying risk areas for compliance with COMSEC regulations and procedures. The program will test and evaluate Crypto Systems compliant devices, Suite B IPsec devices built on commercial standards, CHVP, CSfC Guidance, and new software releases to HAIPE 4.X devices in accordance with AR 700-142 Rapid Action Revision dated 16 October 2008. The program tests interoperability and provides ways to insert data at rest (DAR) and data in transit (DIT) technology within the existing and future network infrastructure. Additionally, this program evaluates performance of technologies</p>	4.372	3.944	6.520	-	6.520

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> DV5 / <i>Crypto Modernization (Crypto Mod)</i>			
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>					
and provides direction to ensure the lowest impact on performance while providing the greatest protection from loss of sensitive data.					
<b>FY 2021 Base Plans:</b> Conduct testing and evaluation of COMSEC devices Link Encryptor Family (LEF), In-Line Network Encryptor (INE), Secure Voice (SV) to confirm capability and interoperability on Army networks and tactical systems as well as identifying risk areas for compliance with COMSEC regulations and procedures, with particular emphasis on the Advanced Cryptographic Capabilities (ACC) program lead by the NSA. The program will test and evaluate Crypto Systems compliant devices, Suite B IPsec devices built on commercial standards, Cryptographic High Value Product (CHVP), Commercial Solutions for Classified (CSfC) Guidance and new software releases to HAIPE 4.X devices in accordance with AR 700-142 Revision dated 8 June 2018. These devices provides the critical security backbone for all NIPRNET, SIPRNET, JWICS and Intelligence networks in both the Tactical and Enterprise networks. The program tests interoperability and provides ways to insert data at rest (DAR) and data in transit (DIT) technology within the existing and future network infrastructure to defend against adversary attack and exploitation. The program tests interoperability and provides ways to insert data at rest (DAR) and data in transit (DIT) technology within the existing and future network infrastructure. Additionally, this program evaluates performance of technologies and provides direction to ensure the lowest impact on performance while providing the greatest protection from loss of sensitive data.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 increase of \$2.576M due to the Advanced Cryptographic Capabilities (ACC) effort phases 2 and 3 which increases the amount of test & evaluation from 5 to 8 devices (KG 245AIX, KIV 7M, STE, KSV 21, KG 250, Ectocrypt Black, Talon 2 and Iridium Follow-On Secure Handset (FOSH)). The Army must comply with National Security ACC policy as managed by NSA to allow for communication of classified information.					
<b>Title:</b> High Assurance Internet Protocol Encryption (HAIPE) extension manager					
<b>Description:</b> A management tool to configure the new extensions to the HAIPE standard and process the resulting data to provide early indications of cyber attacks.					
<b>FY 2020 Plans:</b> Will continue software development efforts that will provide configuration and management of the HAIPE extensions and the user interface for collecting and analyzing the data that results from implementation of these					
	0.946	0.965	0.984	-	0.984



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> DV5 / <i>Crypto Modernization (Crypto Mod)</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>HAIPE extensions. This will facilitate the upgrade of the Army HAIPIES to include new cyber sensor functionality for the tactical cell.</p> <p><b>FY 2021 Base Plans:</b> The program will continue software development efforts that will provide configuration and management of the HAIPE extensions and the user interface for collecting and analyzing the data that results from implementation of these HAIPE extensions. Addition of ACC software feature and new devices will be implemented. This will also facilitate the upgrade of the Army HAIPE to include new cyber sensor functionality for the tactical cell.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 increase of \$.019 due to inflation.</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	5.943	5.655	7.804	-	7.804

<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>
• 491: <i>Information Assurance Development</i>	9.787	8.368	8.009	-	8.009	7.596	7.638	7.593	7.993	Continuing	Continuing
• ET9: <i>Embedded Crypto Modernization (CRYPTO MOD)</i>	20.745	-	0.000	-	0.000	-	-	-	-	0.000	20.745
• B96002: <i>CRYPTOGRAPHIC SYSTEMS (CRYPTO SYS)</i>	26.350	66.242	81.028	0.128	81.156	52.344	52.721	52.168	65.355	0.000	396.336
• B96006: <i>Embedded Cryptographic Modernization</i>	3.520	-	0.000	-	0.000	-	-	-	-	0.000	3.520
• BS9716: <i>NON PEO-SPARES</i>	3.131	3.857	3.896	-	3.896	3.935	3.936	3.996	3.996	0.000	26.747

**Remarks**  
 Line Item & Title:  
 491 - Information Assurance Development - RDTE - funding executed by CIO/G6 and PL ES-CYBER  
 ET9 - Embedded Crypto Modernization - RDTE  
 B96002 - Cryptographic Systems - OPA2  
 B96006 - Embedded Cryptographic Modernization - OPA2  
 BS9716 - NON PEO-SPARES - OPA4

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> DV5 / <i>Crypto Modernization (Crypto Mod)</i>

**D. Acquisition Strategy**

The Cryptographic Systems program integrates and validates hardware and software solutions to provide COMSEC superiority in order to protect against threats, increase battlefield survivability/lethality, and enable critical Mission Command activities. The objective of the Crypto Mod program is to provide adaptive, flexible, and programmable cryptographic systems using best practices, lessons learned and programmatic management to meet the challenge of modernizing the Army's aging cryptographic systems. To support this objective, the Cryptographic Systems Program utilizes NSA contracts in order to procure devices. All existing and emerging encryptors are then tested and evaluated for Functionality, Security, Interoperability, and backward compatibility on software and hardware for both Tactical and Enterprise systems and assessments of new software and hardware updates to end user devices and software to ensure they remain hardened against cyber-attack. The effort will support the network operations from end-to-end throughout the force and the Common Operating Environment (COE) thus mitigating networked vulnerabilities to Army information security systems. CDD, approved by CIO/G6, 15 Jul 2010; ICD, approved by JROC, 25 Mar 2011; AAO; approved by G3, 15 Dec 2011 and revised and approved, 19 Jun 2015.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>											<b>Date: February 2020</b>				
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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>
System Engineering	SS/LH	CCDC C5ISR S&TCD : APG, MD	5.583	0.510	Nov 2018	0.525	Nov 2019	0.540	Nov 2020	-		0.540	Continuing	Continuing	Continuing
Engineering Support	C/CPFF	CACI : Aberdeen Maryland	6.641	0.801	Feb 2019	0.340	Feb 2020	0.310	Feb 2021	-		0.310	Continuing	Continuing	Continuing
Engineering Support	C/CPFF	Booz Allen Hamilton (BAH) : APG, MD	4.332	-		0.578	Feb 2020	0.234	Feb 2021	-		0.234	Continuing	Continuing	Continuing
Engineering Support	C/CPFF	AASKI : Edgewood, Maryland	5.306	0.260	Apr 2019	0.268	Apr 2020	0.200	Apr 2021	-		0.200	Continuing	Continuing	Continuing
Information Assurance System Engineering Support	C/CPFF	Envision : Aberdeen, Maryland	0.966	-		-		-		-		-	0.000	0.966	Continuing
Embedded Crypto Modernization Support	C/LH	Canceled : Canceled	37.770	-		-		-		-		-	0.000	37.770	-
<b>Subtotal</b>			60.598	1.571		1.711		1.284		-		1.284	Continuing	Continuing	N/A

**Remarks**  
 \$2.000M in FY19 funding was returned to the PEO mid-year as excess. FY18 funding originally turned in for recission was partially returned to CS late FY18 and was utilized to pay CCDC C5ISR S&TCD labor in FY19, resulting in the \$2.000M excess FY19 funding being returned. FY21 Plan: No planned excess funding for FY21  
 Envision, Aberdeen, Maryland is a subcontractor under CACI; FY19 and FY21 funding is captured on the CACI line.  
 Embedded Crypto Modernization Support was cancelled.

<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>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Test & Evaluation	SS/LH	CCDC C5ISR S&TCD : APG, MD	-	0.262	Nov 2018	0.272	Nov 2019	1.300	Nov 2020	-		1.300	0.000	1.834	-
Test & Evaluation	C/CPFF	CACI : APG, MD	-	2.485	Feb 2019	1.756	Feb 2020	1.800	Feb 2021	-		1.800	0.000	6.041	-
Test & Evaluation	C/CPFF	Booz Allen Hamilton (BAH) : APG, MD	-	0.985	Feb 2019	1.057	Feb 2020	1.820	Feb 2021	-		1.820	0.000	3.862	-
Test & Evaluation	C/CPFF	AASKI : APG, MD	-	0.640	Apr 2019	0.859	Apr 2020	1.600	Apr 2021	-		1.600	0.000	3.099	-
<b>Subtotal</b>			-	4.372		3.944		6.520		-		6.520	0.000	14.836	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>							<b>Date: February 2020</b>				
<b>Appropriation/Budget Activity</b> 2040 / 7			<b>R-1 Program Element (Number/Name)</b> PE 0303140A / Information Systems Security Program				<b>Project (Number/Name)</b> DV5 / Crypto Modernization (Crypto Mod)				
	<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>	60.598	5.943		5.655		7.804	-	7.804	Continuing	Continuing	N/A

Remarks

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> DV5 / <i>Crypto Modernization (Crypto Mod)</i>

Event Name	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
VINSON/ANDVT Cryptograph Modernization (VACM) INTEROPERABILITY	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
TEST AND EVALUATION OF LINK/TRUNK ENCRYPTORS SW	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
TEST AND EVALUATION OF SECURE VOICE SW & HW	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
TEST AND EVALUATION OF INE SW & HW	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
HAIFE EXTENSION MANAGER	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> DV5 / <i>Crypto Modernization (Crypto Mod)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
VINSON/ANDVT Cryptograph Modernization (VACM) INTEROPERABILITY	1	2016	4	2023
TEST AND EVALUATION OF LINK/TRUNK ENCRYPTORS SW	1	2016	4	2021
TEST AND EVALUATION OF SECURE VOICE SW & HW	4	2013	4	2025
TEST AND EVALUATION OF INE SW & HW	1	2017	4	2025
HAIPE EXTENSION MANAGER	1	2017	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7				<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>				<b>Project (Number/Name)</b> ET9 / <i>Embedded Crypto Modernization (CRYPTO MOD)</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>
ET9: <i>Embedded Crypto Modernization (CRYPTO MOD)</i>	-	20.745	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	20.745
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Project ET9, Embedded Crypto Modernization (Crypto Mod) supports the Army's Network Modernization Strategy Lines of Effort (LOE) 1 Network Enablers Functions.

Modernize the AN/ARC-201D Single Channel Ground and Airborne Radio Systems (SINGARS) to meet CJCSI mandated cryptographic requirements through the execution of an engineering change effort to provide a bridging radio solution for Army Aviation rotary wing platforms. Support the Unified Network key near term imperative of achieving air-ground integration. Crypto modernization will ensure compliance with Key Management Infrastructure (KMI), add algorithms that address cyber vulnerabilities, improve 'secure but unclassified' network support, and provide better support to coalition interoperability.

Embedded Cryptographic Modernization Initiative (ECMI) is an upgrade activity that will ensure Army radios remain secure by operating with modern cryptographic algorithms. Tactical radios using legacy embedded cryptographic systems will no longer be able to communicate securely after cease key dates documented in the Chairman of the Joint Chiefs Staff instruction (CJCSI) 6510. In order to ensure Warfighters continue to have secured communications (i.e., encrypted data and voice), Army tactical radios are required to support modern cryptographic capabilities by implementing modern algorithms. If cease key dates are not met, the Army will be forced to communicate at risk.

**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> FY19 Rescission	20.745	-	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	20.745	-	-	-	-

**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>
• 491: <i>Information Assurance Development</i>	9.787	8.368	8.009	-	8.009	7.596	7.638	7.593	7.993	Continuing	Continuing
• DV5: <i>Crypto Modernization (Crypto Mod)</i>	5.943	5.655	7.804	-	7.804	7.893	8.180	8.240	8.286	Continuing	Continuing
• B96002: <i>CRYPTOGRAPHIC SYSTEMS (CRYPTO SYS)</i>	26.350	66.242	81.028	0.128	81.156	52.344	52.721	52.168	65.355	0.000	396.336

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> ET9 / <i>Embedded Crypto Modernization (CRYPTO MOD)</i>
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**C. Other Program Funding Summary (\$ in Millions)**

<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>						
• B96006: <i>Embedded Cryptographic Modernization</i>	3.520	-	0.000	-	0.000	-	-	-	-	0.000	3.520
• BS9716: <i>NON PEO-SPARES</i>	3.131	3.857	3.896	-	3.896	3.935	3.936	3.996	3.996	0.000	26.747

**Remarks**

Line Item & Title:

491 - Information Assurance Development - RDTE - funding executed by PL Net E, CIO/G6 and PL ES-CYBER

DV5 - Crypto Modernization - RDTE

B96002 - Cryptographic Systems - OPA2

B96006 - Embedded Cryptographic Modernization - OPA2

BS9716 - NON PEO-SPARES - OPA4

**D. Acquisition Strategy**

The objective of the ECMI program is to provide adaptive, flexible, and programmable embedded cryptographic solutions using best practices, lessons learned and programmatic management to meet the challenge of modernizing the Army's aging cryptographic tactical radios. ECMI will design, develop, and execute upgrade activities to ensure non modernized Army tactical radios will be able to accept and utilize modern cryptographic algorithms.

Applicable documents affecting Tactical Radio ONS, ORD, & CPDs requiring crypto:

CDD for Cryptographic Equipment and Services Modernization, Increment 1, dated March 2010.

CJCSI 6510.02E - "Cryptographic Modernization Planning", 01 April 2014.

CNSSP-15 - "National Information Assurance Policy on the Use of Public Standards for the Secure Sharing of Information Among National Security Systems", 01 October 2012.

NSA CSS 3-9 - "Cryptographic Modernization Initiative Requirements for Type 1 Cryptographic Products", dated 28 March 2013.

Memorandum from Army Acquisition Executive with subject "Management and Procurement of Communications Security (COMSEC) Capability, dated 28 Feb 2012.



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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0303140A / Information Systems Security Program				ET9 / Embedded Crypto Modernization (CRYPTO MOD)							
<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
AMF-ARC-201D Crypto Mod - SE/PM	TBD	TBD : TBD	1.639	-		-		-		-		-	0.000	1.639	-
<b>Subtotal</b>			1.639	-		-		-		-		-	0.000	1.639	N/A
<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
PM TR Program Mgmt Personnel	C/CPFF	TBD : Aberdeen, MD	7.953	1.037		-		-		-		-	0.000	8.990	-
PM TR Program Mgmt Personnel	C/CPFF	BAH : Aberdeen, MD	1.424	-		-		-		-		-	0.000	1.424	-
AMF-ARC-201D Crypto Mod - Dev Engineering & Prototyping	TBD	TBD : TBD	22.752	19.708		-		-		-		-	0.000	42.460	-
<b>Subtotal</b>			32.129	20.745		-		-		-		-	0.000	52.874	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
AMF-ARC-201D Crypto Mod - Test and Evaluation	TBD	TBD : TBD	19.555	-		-		-		-		-	0.000	19.555	-
<b>Subtotal</b>			19.555	-		-		-		-		-	0.000	19.555	N/A
<b>Project Cost Totals</b>			53.323	20.745		0.000		-		-		-	0.000	74.068	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>							<b>Date:</b> February 2020													
<b>Appropriation/Budget Activity</b> 2040 / 7							<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>							<b>Project (Number/Name)</b> ET9 / <i>Embedded Crypto Modernization (CRYPTO MOD)</i>						

FY 2012				FY 2013				FY 2014				FY 2015				FY 2016				FY 2017				FY 2018			
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

Market Research	
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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

Market Research	
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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> ET9 / <i>Embedded Crypto Modernization (CRYPTO MOD)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Market Research	1	2017	4	2018

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> FF8 / <i>Unit Activity Monitoring (UAM)</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
<i>FF8: Unit Activity Monitoring (UAM)</i>	-	0.971	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.971
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

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

User activity monitoring (UAM) automation/analytics will provide technical capability to enhance Army UAM analysis effectiveness and efficiency. The UAM mission is to observe and record the actions and activities of an individual, at any time, on any device accessing Army information on classified networks in order to detect insider threats and to support authorized investigations. Army UAM is a component of the Army Insider Threat (InT) Program. Army's InT Program and UAM are conducted in accordance with the National Defense Authorization Act for FY 2012, section 922., Insider Threat Detection; Presidential Memorandum, National Insider Threat Policy and Minimum Standards for Executive Branch Insider Threat Programs, dated 21 November 2012; Executive Order 13587, Structural Reforms to Improve the Security of Classified Networks and the Responsible Sharing and Safeguarding of Classified Information, (Reference b) dated 7 October 2011, and Army Directive 2013-18 (Army Insider Threat Program), 31 July 2013. Innovative enhancements are required to improve UAM analysis productivity, data visualization, and workflow management. The analysis productivity objective is to develop and implement user behavior models that use UAM and other network data to identify anomalous user behavior over time, and to integrated new data sources into the UAM analytical data store and processing system. Data visualization advances will present UAM analysts behavior model processing results in an intuitive format that reduce the time required to review the results. Workflow management improvements will add new capabilities to the UAM workflow management system with the objective of enhancing analysis reporting productivity and metrics collection.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<b>Title:</b> Unit Activity Monitoring	0.971	-	-	-	-
<b>Description:</b> FY 2019 Base funds in the total amount of \$.971 million are provided for software engineering development and testing resources to enhance the Army's UAM data processing, analysis, and data visualization capabilities, and its workflow management system, plus the integration of new data sources into the data processing component. All work is focused on the development of new capabilities.					
The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).					
<b>Accomplishments/Planned Programs Subtotals</b>	0.971	-	-	-	-

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

N/A

**Remarks**

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / Information Systems Security Program	Project (Number/Name) FF8 / Unit Activity Monitoring (UAM)

**D. Acquisition Strategy**

FY 2019: The planned acquisition strategy to acquire UAM Automation/Analytics software engineering services is to award through the use of competitive acquisition, a Base plus three-option year firm-fixed price contract.

FY 2019: The planned acquisition is to exercise next option year of the software engineering services contract.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> FF8 / <i>Unit Activity Monitoring (UAM)</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	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years												
Software Engineering Development	C/TBD	TBD : TBD	19.491	0.971	Jun 2019	-		-		-		-	0.000	20.462	Continuing
<b>Subtotal</b>			19.491	0.971		-		-		-		-	0.000	20.462	N/A
<b>Project Cost Totals</b>			19.491	0.971		0.000		-		-		-	0.000	20.462	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>							<b>Date:</b> February 2020													
<b>Appropriation/Budget Activity</b> 2040 / 7							<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>							<b>Project (Number/Name)</b> FF8 / <i>Unit Activity Monitoring (UAM)</i>						

	FY 2012				FY 2013				FY 2014				FY 2015				FY 2016				FY 2017				FY 2018							
	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				
Contract Award																																

	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
Contract Award																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303140A / <i>Information Systems Security Program</i>	<b>Project (Number/Name)</b> FF8 / <i>Unit Activity Monitoring (UAM)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Contract Award	3	2018	3	2018



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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support 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	-	51.415	60.076	86.908	-	86.908	32.518	0.000	0.000	0.000	0.000	230.917
083: <i>Global Combat Support Sys - Army</i>	-	1.255	6.109	21.675	-	21.675	17.590	0.000	0.000	0.000	0.000	46.629
EK2: <i>GCSS-A Increment 2</i>	-	50.160	53.967	65.233	-	65.233	14.928	0.000	0.000	0.000	0.000	184.288

**Note**

Effective February 2, 2017, the Department of Defense Instruction (DODI) 5000.75 was issued to establish policy for use of Business Capability Acquisition Cycle for Defense Business Systems. The DODI 5000.75 supersedes DODI 5000.02, improving the alignment of business systems to commercial best practices as well as optimizing efficiencies and effectiveness across the DOD for the acquisition of business systems. Decisions rendered by the Milestone Decision Authority, as outlined in the DODI 5000.75, are referred to as "Authority To Proceed" and replace DODI 5000.02 "Milestones."

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

GCSS-Army Increment 1 gives combat forces a decisive edge by providing soldiers a seamless flow of timely, accurate, accessible, and secure logistics information to get combat power at the right place, at the right time. The GCSS-Army program is an information and communications technology investment that provides key enabling support to the transformation of the Army into a network-centric, knowledge-based future force. GCSS-Army implements best business practices to streamline supply, accountability, maintenance, distribution, and reporting procedures in support of the future force transition path of The Army Campaign Plan.

GCSS-Army Increment 2 builds on the current foundation by providing auditable Army Enterprise Aviation maintenance, enhanced Business Intelligence/Business Warehouse (BI/BW) and Army Pre-Positioned Stock (APS) functional capabilities and will sunset legacy systems: the Aircraft Notebook and Army War Reserve Deployment System (AWRDS). Increment 2 will deliver greater efficiencies to Aviation Logistics warfighters and improved information flow and accuracy in real time to decision makers, helping them make better decisions faster on the battlefield. The APS capabilities directly impact the speed at which a deploying unit can draw combat equipment.

The FY 2020 funding provides for the engineering, design, development, and integration of GCSS-Army Increment 2 into the Increment 1 baseline. It also supports critical change requests, coming from the warfighter and prioritized by the Combat Developer, for the baseline system.

The FY 2021 funding provides for the continuation of engineering, design, development, integration, and testing of the GCSS-Army Increment 2. The funding also builds edge software for disconnected supply, maintenance and accountability, leveraging the Increment 2 architecture and revised technical approach approved in FY 2019. The FY 2021 funding also supports trade studies, analysis and market research for SAP based ERP integration, consolidation and efficiencies.

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</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	53.855	68.976	67.974	-	67.974
Current President's Budget	51.415	60.076	86.908	-	86.908
Total Adjustments	-2.440	-8.900	18.934	-	18.934
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-8.900			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.440	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	18.934	-	18.934

**Change Summary Explanation**

FY 2021 Increment 1 funding was increased above FY 2020 level to fund disconnected operations development. RDTE funds are needed for first year of a two year development effort to cover all design, development, test and evaluation efforts to develop a disconnected operations solution for GCSS-Army.

GCSS-Army INC2- On 4 June 2019 the Army Acquisition Executive approved a modification in strategy to an SAP Agile Deployment Operations (ADO) technical solution which shifted RDTE requirements and fielding schedules, resulting in changes to funding requirements and plans to Wave 1 (Enterprise Aviation) in FY20 and FY21. This also affected plans for Wave 2 (Business Intelligence/Business Warehouse) and Wave 3 (Army Prepositioned Stock-APS).

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>					<b>Project (Number/Name)</b> 083 / <i>Global Combat Support Sys - Army</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>
083: <i>Global Combat Support Sys - Army</i>	-	1.255	6.109	21.675	-	21.675	17.590	0.000	0.000	0.000	0.000	46.629
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

GCSS-Army Increment 1 provides critical Army sustainment support to the soldier with a seamless flow of timely, accurate, accessible, and secure information management that gives combat forces a decisive edge and is essential for combat readiness. GCSS-Army implements best business practices to streamline supply, accountability, maintenance, distribution, and reporting procedures in support of the future force transition path of The Army Campaign Plan. GCSS-Army is financially compliant and is a key component for the Army Enterprise Strategy to be financially auditable.

The FY 2021 funding builds edge software for disconnected supply, maintenance and accountability, leveraging the Increment 2 architecture and revised technical approach approved in FY 2019. The Army requires a single disconnected operations architecture for GCSS-Army to support the ground and aviation missions. Currently the Army has battlefield gaps without network connectivity: inability to maintain or regenerate combat power, order/process spare parts, track battle losses, or conduct maintenance. The disconnected operations architecture, using FY 2021 RDTE funding, will alleviate these problems when there are disruptions in communications or cyber-attacks. The FY 2019 and FY 2020 funding also supports critical change requests, coming from the warfighter and prioritized by the Combat Developer, for the baseline system.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Product Development	1.255	5.831	21.675
<p><b>Description:</b> The funds in the GCSS-Army Increment 1 RDT&amp;E line are for building the edge software for disconnected supply, maintenance and accountability, leveraging the Increment 2 architecture and revised technical approach approved in FY 2019. The Army requires a single disconnected operations architecture for GCSS-Army to support ground and aviation mission. The funds in FY 2019 and FY 2020 are for critical change requests, coming from the warfighter and prioritized by the Combat Developer. In FY 2021 the Army will commence design, development and build of disconnected operations capability to support ground operations, leveraging Increment 2 architecture.</p> <p><b>FY 2020 Plans:</b> After transition to capability support, RDT&amp;E funding will be used to execute critical change requests to enhance capability support activities, improve readiness, system usability, automated accountability, auditability, and calculations of total cost of ownership. Implementation of critical change requests enhance functional capabilities and improve system effectiveness by synchronizing system data and utilizing enterprise interface tools to eliminate input errors.</p> <p><b>FY 2021 Plans:</b></p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>	<b>Project (Number/Name)</b> 083 / <i>Global Combat Support Sys - Army</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>Currently the Army has battlefield gaps without network connectivity: inability to maintain or regenerate combat power, order/process spare parts, track battle losses, or conduct maintenance. The FY 2021 funding builds edge software for disconnected supply, maintenance and accountability, leveraging the Increment 2 architecture and revised technical approach approved in FY 2019. The disconnected operations architecture, using FY 2021 RDTE funding, will alleviate these problems when there are disruptions in communications or cyber-attacks.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 funding was increased above the FY 2020 level to fund the first year of a two year development effort for disconnected ground operations. FY 2021 funding will cover all design and development efforts to develop the edge software and front end user interface screens to allow soldiers to operate disconnected. This is a critical requirement validated by Army in order to regenerate combat power, order/process spare parts, track battle losses, or conduct maintenance when there are disruptions in communications or cyber-attacks.</p>			
<p><b>Title:</b> FY 2020 SBIR/STTR Transfer</p> <p><b>Description:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638</p>	-	0.278	-
<b>Accomplishments/Planned Programs Subtotals</b>	1.255	6.109	21.675

<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>
• W00800: <i>GCSS-A Increment 1</i>	7.085	-	0.000	-	0.000	-	-	-	-	-	Continuing Continuing

**Remarks**

**D. Acquisition Strategy**  
GCSS-Army will design and develop the edge software for disconnected ground operations tapping into the technical architecture that is being developed in Increment 2, Army Enterprise Aviation. The program will design and build user screens for disconnected supply, maintenance and accountability, leveraging the core framework that will already be established in another part of the program. The Army will use a single disconnected operations architecture for GCSS-Army to support the ground and aviation missions.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<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>
2040 / 7	PE 0303141A / <i>Global Combat Support System</i>	083 / <i>Global Combat Support Sys - Army</i>

The program office (INC 2) will award a base year contract with 3 option years in FY 2020, using a Department of Defense Enterprise Software Initiative (DoD ESI) contract, to design and develop the core architecture that will be used for disconnected ground and aviation operations. In FY21, utilizing the DoD ESI contract, the program will start to design and develop the core architecture that will be used for disconnected ground operations leveraging aviation architecture.

GCSS-Army will also leverage the partnership with the U.S. Army Communications-Electronics Command, and supplement the design and development team with architecture and engineering support from the existing support contract.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>	<b>Project (Number/Name)</b> 083 / <i>Global Combat Support Sys - Army</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			
1 . PM GCSS-Army- PMO Operations	Various	PM GCSS-Army : Fort Lee, VA 23805	103.931	-		-		-		-		-	0.000	103.931	62.385
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.278		-		-		-	0.000	0.278	-
<b>Subtotal</b>			103.931	-		0.278		-		-		-	0.000	104.209	N/A

<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			
Enterprise Resource Planning (ERP) design and development	C/FPAF	Northrop Grumman Information Systems : Chester, VA 23836	465.845	1.213		-		-		-		-	0.000	467.058	457.056
Government Developer Subject Matter Experts	IA	ASA (FM&C), CASCOM and GFEBs : Various Locations	22.315	-		-		-		-		-	0.000	22.315	19.730
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	0.042		-		-		-		-	0.000	0.042	-
Disconnected Ground Operations	SS/FFP	DOD ESI Multi Vendor : Arlington VA	-	-		-		21.675		-		21.675	19.218	40.893	-
Continuous Enhancements	TBD	TBD : TBD	-	-		5.831	May 2020	-		-		-	6.182	12.013	-
<b>Subtotal</b>			488.160	1.255		5.831		21.675		-		21.675	25.400	542.321	N/A

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>	<b>Project (Number/Name)</b> 083 / <i>Global Combat Support Sys - Army</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			
1. PM Support - Independent Verification and Validation (IV&V)	C/T&M	CAP Gemini : 2250 Corporate Park Dr, Herndon, VA 20171	1.031	-		-		-		-		-	0.000	1.031	1.031
2. PM Support - Program Management Support Services A	C/T&M	Engility Corporation : 3750 Centerview Drive Chantilly, VA 20151	1.386	-		-		-		-		-	0.000	1.386	-
3. PM Support - Program Management Support Services B	C/T&M	Logistics Management Institute : Colonial Heights, VA 23834	42.101	-		-		-		-		-	0.000	42.101	42.101
<b>Subtotal</b>			44.518	-		-		-		-		-	0.000	44.518	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			
1. Test and Evaluation - Test and Evaluation	C/IDIQ	Northrop Grumman : McLean VA	39.950	-		-		-		-		-	0.000	39.950	-
<b>Subtotal</b>			39.950	-		-		-		-		-	0.000	39.950	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>	676.559	1.255	6.109	21.675	-	21.675	25.400	730.998	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date: February 2020</b>		
<b>Appropriation/Budget Activity</b> 2040 / 7		<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>		<b>Project (Number/Name)</b> 083 / <i>Global Combat Support Sys - Army</i>	

Event Name	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
Continuous Enhancements (Design and Development)																												
Disconnected Ground Operations (Development Testong and Deployment)																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>	<b>Project (Number/Name)</b> 083 / <i>Global Combat Support Sys - Army</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Seg 2 Contract Award	1	2008	1	2008
Increment 1 - Acquisition Review	2	2008	2	2008
Increment 1/Segment 1 Operational Assessment	1	2008	3	2010
Increment 1 - Milestone B	4	2008	4	2008
Increment 1/Release 1.1 DTOE	3	2010	4	2010
GCSS-Army Release 1.1 Design, Build, Test & Stabilize	1	2011	3	2011
Increment 1 - Milestone C	4	2011	4	2011
Release 1.1 Intial Operational Test and Evaluation (IOT&E)	1	2012	1	2012
Release 1.1 Stabilization	2	2011	1	2013
Lead Site Verification	1	2013	1	2013
Release 1.1 Full Deployment Decision	1	2013	1	2013
Field Wave 1	1	2013	1	2016
GCSS-Army Release 1.2 (Wave 2) Plan, Analyze, Design, Build & Test	3	2011	4	2015
Release 1.2 (Wave 2) Lead Site Verification Test	3	2015	3	2015
Release 1.2 (Wave 2) In Progress Review	4	2015	4	2015
Field Release 1.2 (Wave 2)	1	2015	1	2018
Continuous Enhancements (Design and Development)	1	2018	4	2022
Disconnected Ground Operations (Development Testong and Deployment)	1	2021	4	2022

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>	<b>Project (Number/Name)</b> EK2 / <i>GCSS-A Increment 2</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
EK2: <i>GCSS-A Increment 2</i>	-	50.160	53.967	65.233	-	65.233	14.928	0.000	0.000	0.000	0.000	184.288
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

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

GCSS-Army Increment 1 gives combat forces a decisive edge by providing soldiers a seamless flow of timely, accurate, accessible, and secure logistics information to get combat power at the right place, at the right time. The GCSS-Army program is an information and communications technology investment that provides key enabling support to the transformation of the Army into a network-centric, knowledge-based future force. GCSS-Army implements best business practices to streamline supply, accountability, maintenance, distribution, and reporting procedures in support of the future force transition path of The Army Campaign Plan.

GCSS-Army Increment 2 builds on the current foundation by providing auditable Army Enterprise Aviation maintenance, enhanced Business Intelligence/Business Warehouse (BI/BW) and Army Pre-Positioned Stock (APS) functional capabilities and will sunset legacy systems: the Aircraft Notebook and Army War Reserve Deployment System (AWRDS). Increment 2 will deliver greater efficiencies to Aviation Logistics warfighters and improve information flow and accuracy in real time to decision makers, helping them make better decisions faster on the battlefield.

In FY 2019, the AAE approved a new technical approach for Enterprise Aviation, which will utilize a commercial disconnected architecture capability from SAP, called Agile Deployed Operations (ADO). ADO will allow the Army to extend the fully integrated Enterprise Aviation capability to a disconnected platform and will provide timely and accurate visibility and accountability of materiel down to the unit level. ADO developed under the Enterprise Aviation effort will also serve as the foundation for disconnected ground operations. Enterprise Aviation will replace a legacy standalone client server architecture and integrate its functionalities into an enterprise system.

Implementation of the BI/BW capabilities provide enhancements in materiel and supply chain readiness analytics that are critical to inform commanders' understanding of weapons systems readiness, helping them make better decisions faster on the battlefield.

The APS capabilities directly impacts the speed at which a deploying unit can draw combat equipment while reducing the burden of the day-to-day maintenance and accountability of APS stock.

The FY 2021 funding will continue design, development, and incremental testing for Enterprise Aviation capability in the GCSS-Army baseline software; will continue to develop the SAP disconnected operations technical architecture; and will begin development to re-platform the Aircraft Notebook in order to sunset this legacy system. FY 2021 RDTE funds will also allow the Army to develop critical maintenance, supply and financial reports that will be used for Enterprise Aviation and key functional areas in order to improve readiness reporting. Finally, FY 2021 funding will address the requirements to allow units to quickly draw APS stocks.

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

	FY 2019	FY 2020	FY 2021
<b>Title:</b> System Design, Develop and Build	49.535	50.798	64.378

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>	<b>Project (Number/Name)</b> EK2 / <i>GCSS-A Increment 2</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> The purpose of this phase is to begin the system development for an incremental capability that is affordable and executable to satisfy the Key Performance Parameters and Key System Attributes.</p> <p><b>FY 2020 Plans:</b> Enterprise Aviation (EAVN): PM will field Release 1 to 2,000 new users in addition to the existing Aviation GCSS-Army users for recording off-platform tracked equipment repairs. Release 1 also delivers Master Data capabilities ACN platform. The PM will demonstrate that production/deployment design is stable, the design will meet stated and derived requirements based on acceptable performance in developmental test events, provide mature software capability consistent with the software development schedule, incur no significant production risks, and demonstrate interoperability and operational supportability. Release 1 will complete full deployment in early FY 2021. The PM will develop EAVN Release 2 primarily focusing on the disconnected Agile Deployed Operations (ADO) capability that Army Aviation requires. PM will finalize designs for product support elements and integrate them into a comprehensive product support package ready for production and deployment.</p> <p>BI/BW elements related to data visualization, reporting and data analytics will complete software development. PM will finalize designs for product support elements and integrate them into a comprehensive product support package ready for production and deployment in early FY 2021.</p> <p>Additional BI/BW capabilities associated with realizing further enhancements in business intelligence, common operating picture and data analytics across the Army logistics enterprise will begin software development to include system design and a series of design reviews prior to test article fabrication and/or software build or coding.</p> <p><b>FY 2021 Plans:</b> After FY 2020 contract award, in FY 2021 the program will continue design, development, and incremental testing for Enterprise Aviation software Release 2, which includes 1) required changes in the GCSS-Army baseline and the AESIP Enterprise Hub to accommodate the development and integration of the Enterprise Aviation solution; 2) continued development of the SAP Agile Deployed Operations (ADO) technical architecture solution into FY21, which will also serve as a required foundation for GCSS-Army disconnected ground capabilities; and 3) initiation of the development effort to re-platform the Aircraft Notebook (ACN) functionality into an integrated user edge device. Re-platforming will allow the Army to sunset the ACN legacy system and its standalone client server architecture.</p> <p>Implementation of GCSS-Army Wave 2 BI/BW reporting capabilities will provide enhancements to materiel and supply chain readiness with an additional capability to perform self-service analytics. The analyses will provide critical information to commanders' on weapons systems readiness enabling them to make quick decisions on the battlefield. BI/BW reporting will</p>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>	<b>Project (Number/Name)</b> EK2 / <i>GCSS-A Increment 2</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>provide visibility and associated costs of materials and equipment, at the tactical and national levels, for Supply, Maintenance, Property Book functions, helping to improve lifecycle management and auditability.</p> <p>As directed, following an FY 2020 gap analysis, APS development will include integration of worldwide APS business processes to include conduct of operational assessment of APS in order to operationalize logistics management of APS overseas to improve readiness posture.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> RDTE funding increased in FY 2021 to accommodate an approved new technical solution. The new technical solution involves leveraging the SAP deployed operations technical architecture, known as Agile Deployed Operations (ADO), and the re-platforming effort to integrate Aircraft Notebook functionality into GCSS Army. The revised technical approach involves increased development effort for FY 2021.</p>				
<p><b>Title:</b> Government System Test and Evaluation</p> <p><b>Description:</b> Government System Test and Evaluation</p> <p><b>FY 2020 Plans:</b> Independent Government Testing on EAVN Release 1.</p> <p><b>FY 2021 Plans:</b> FY 2021 funding will provide for government personnel to conduct continuous evaluation assessment of developmental testing.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Release 1 government testing will be completed in FY20. Release 2 government testing will commence in FY 2022.</p>		0.625	0.719	0.855
<p><b>Title:</b> FY 2020 SBIR/STTR Transfer</p> <p><b>Description:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638</p>		-	2.450	-
<b>Accomplishments/Planned Programs Subtotals</b>		50.160	53.967	65.233

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>	<b>Project (Number/Name)</b> EK2 / <i>GCSS-A Increment 2</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
• W11011: <i>GCSS-Army Increment 2</i>	6.841	6.841	0.794	-	0.794	9.946	-	-	-	0.000	24.422
• OMA - 423612000-OMA: <i>GCSS-Army Increment2</i>	4.357	-	16.791	-	16.791	20.146	-	-	-	0.000	41.294

**Remarks**

**D. Acquisition Strategy**

GCSS-Army Increment 2 continues the evolutionary acquisition strategy of Increment 1 and will define, develop, and deploy additional and enhanced capabilities to GCSS-Army based upon proven technology, time-phased requirements, projected threat assessments, and demonstrated manufacturing capabilities. The program office will award a base year contract with 3 option years in FY 2020, using a Department of Defense Enterprise Software Initiative (DoD ESI) contract, to design and develop the core architecture that will be used for disconnected ground and aviation operations. This same contract vehicle will also be used to build the edge software for disconnected supply, maintenance and accountability.

GCSS-Army will also leverage the partnership with the U.S. Army Communications-Electronics Command, and supplement the design and development team with architecture and engineering support from the existing support contract.

GCSS-Army Increment 2 is being implemented in three waves:

Wave 1 provides the Army Enterprise Aviation logistics capability. Government System Integrator is the Combat Capability Development Command (CCDC) Aviation and Missile Center, System Simulation and Software Integration (S3I) Directorate.. Department of Defense (DoD) Enterprise Software Initiative (ESI) blanket purchase agreement (BPA) contract will be awarded in 2020.

Wave 2 provides the enhanced BI/BW capability. Contract was awarded June 2019.

Wave 3 provides the APS capability. Contract award TBD.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>	<b>Project (Number/Name)</b> EK2 / <i>GCSS-A Increment 2</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			
PMO Operations	Allot	PMO : Huntsville AL	1.860	-		-		-		-		-	0.000	1.860	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		2.450		-		-		-	0.000	2.450	-
<b>Subtotal</b>			1.860	-		2.450		-		-		-	0.000	4.310	N/A

<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			
EAVN Blueprinting	RO	AMRDEC : Huntsville AL	89.282	1.533		-		-		-		-	0.000	90.815	90.815
EAVN System Design, Develop and Build	C/T&M	CCDC Aviation and Missile Cmd : Huntsville AL	-	34.139	May 2019	31.111	Oct 2019	30.634	Oct 2020	-		30.634	20.062	115.946	115.397
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	2.398		2.269		2.533		-		2.533	1.407	8.607	-
EAVN ADO Development	C/FFP	DOD ESI : Arlington VA	-	-		6.112		16.614		-		16.614	2.366	25.092	25.337
EAVN SME Services	C/T&M	DOD ESI : Richmond VA	-	-		1.555		1.667		-		1.667	1.701	4.923	5.168
EAVN SETA Supt	C/T&M	LMI : Arlington VA	-	5.963	Dec 2018	7.035	Dec 2019	7.197	Dec 2020	-		7.197	6.924	27.119	27.364
BI/BW Development	C/FFP	4M : Huntsville AL	-	2.140		0.918		2.403		-		2.403	4.971	10.432	10.677
BI/BW Program/SETA Support	C/T&M	LMI : Arlington VA	-	1.259		0.627		0.889		-		0.889	1.335	4.110	4.355
Program Support	TBD	Various : Various	-	0.748		0.486		1.219		-		1.219	1.335	3.788	4.033
EAVN Government Matrix Supt	RO	CCDC Aviation and Missile Cmd : Huntsville A	-	1.355		0.930		1.222		-		1.222	0.000	3.507	-
<b>Subtotal</b>			89.282	49.535		51.043		64.378		-		64.378	40.101	294.339	N/A



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>	<b>Project (Number/Name)</b> EK2 / <i>GCSS-A Increment 2</i>

Event Name	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
Full Deployment ATP													▲ 1															
Capability Support ATP																	▲ 2											
Rel 1 EAVN Blueprinting/ SW Development																												
Rel 1 Testing																												
Rel 1 Deployment																												
Release 2 EAVN Blueprinting/R2 SW Development																												
Rel 2 Testing																												
Rel 2 Deployment																												
Business Intelligence/Business Warehouse Blueprinting/Develop																												
APS Blueprinting/Development/Testing//Deployment																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303141A / <i>Global Combat Support System</i>	<b>Project (Number/Name)</b> EK2 / <i>GCSS-A Increment 2</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MDA Meeting	2	2016	2	2016
Full Deployment ATP	4	2022	4	2022
Capability Support ATP	1	2024	1	2024
Rel 1 EAVN Blueprinting/ SW Development	1	2018	4	2019
Rel 1 Testing	1	2018	2	2020
Rel 1 Deployment	4	2019	3	2020
Release 2 EAVN Blueprinting/R2 SW Development	3	2018	3	2021
Rel 2 Testing	1	2022	4	2022
Rel 2 Deployment	1	2023	1	2024
Business Intelligence/Business Warehouse Blueprinting/Development	1	2019	4	2022
APS Blueprinting/Development/Testing//Deployment	1	2022	4	2023

**Note**

The schedule for GCSS-Army Increment 2 is based upon the Army Acquisition Executive (AAE) decision to utilize the Government System Integrator. Schedule reflects three releases for Enterprise Aviation (Wave 1), one release for Business Intelligence/Business Warehouse (Wave 2), and one release for Army Prepositioned Stock (Wave 3).

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / <i>SATCOM Ground Environment (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	0.000	18.684	-	18.684	21.707	16.967	15.282	14.602	Continuing	Continuing
253: <i>Dscs-Dcs (Phase II)</i>	-	0.000	0.000	4.372	-	4.372	4.495	4.556	4.565	4.885	Continuing	Continuing
456: <i>MILSATCOM System Engineering</i>	-	0.000	0.000	14.312	-	14.312	17.212	12.411	10.717	9.717	0.000	64.369

**Note**

This is not a new start.

SATCOM Ground Environment (SPACE) funding has been realigned to 0303142A from 1203142A in FY 2021 and out.

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

Project 253, Dscs-Dcs (Phase II), SATCOM Ground Environment (SPACE) supports the Army's Network Modernization Strategy Line of Effort (LOE) 1 - Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

FY 2021 Base funding in the amount of \$4.376 million develops Satellite Communication (SATCOM) ground subsystem equipment and software in support of Joint Chiefs of Staff (JCS) validated Mission Command Network and Systems requirements for the worldwide Defense Enterprise Wideband SATCOM System (DEWSS). DEWSS is composed of the Super High Frequency (SHF) Defense Satellite Communications System (DSCS) and Wideband Global SATCOM (WGS) programs, which are required to support legacy, interim and emerging communication space architectures and future force requirements. Expansion of the WGS constellation and upgrades to both DSCS and WGS are vital to support the Army's emerging power projection and rapid deployment role. DSCS and WGS provide multiple channels of tactical end-to-end connectivity and interoperability with strategic networks and national decision-makers, satisfying JCS network operations in support of the President, JCS, combatant commanders, military departments, Department of State and other government departments and agencies.

Project 456, MILSATCOM System Engineering supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network Cross-Functional Team capability set approach to achieve the network modernization strategy.

456 - MILSATCOM System Engineering assures the tactical Army satellite communications (SATCOM) and SATCOM On-the-Move (SOTM) systems are engineered to legally and efficiently operate worldwide. MILSATCOM System Engineering shapes Joint SATCOM systems' design efforts, standards development and planning processes. MILSATCOM System Engineering represents the Army's tactical interests within DoD, Commercial and International forums to ensure affordable and scalable future SATCOM capabilities for maneuver forces. These efforts ensure that the Army continues to evaluate evolving technologies for the planning and designing of SATCOM solutions that reduce technical and programmatic impacts.

Project 456 also includes Protected Anti-jam Tactical SATCOM efforts, which fill a critical communications gap for anti-jam SATCOM capability for mobile ground forces conducting expeditionary operations in electronically contested environments. It provides the ability for the tactical Army to be resilient in a contested environment and

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / <i>SATCOM Ground Environment (SPACE)</i>
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protect against catastrophic loss of situational awareness and command and control during critical battle movement. It will offer the tactical Army protection against interference that is either intentional or unintentional. These efforts are synchronized with the Air Force and DoD's plans for Protected Tactical Waveforms (PTW) on Wideband Global SATCOM (WGS), the Protected Tactical Satellite (PTS), and commercial SATCOM systems.

Protected Anti-jam Tactical SATCOM is a continuation of efforts previously funded under the MILSATCOM System Engineering (1203142A/FE2) and Protected Anti-jam Tactical SATCOM (1203142A/FI8) lines. MILSATCOM System Engineering supported development and testing of prototype PTW modems during the Protected Tactical Service Field Demo (PTSFD) in FY 2019. Protected Tactical Anti-jam SATCOM supported initial development, testing and certification of production representative PTW modems, incorporating Army specific requirements, to support continued spiral development of critical protected communications capabilities to address resiliency in jamming environments in FY 2020.

FY 2021 funding supports the systems engineering required to support technology maturation, systems analysis, and planning associated with Joint SATCOM development efforts. This line continues to fund the systems architecture and analysis for current and future SATCOM efforts in both wideband and protected satellite communications. This effort includes collaborative work with the Air Force on the prototype Protected Tactical Waveform (PTW) modem development and testing during the Protected Tactical Service Field Demo (PTSFD). It also funds system engineering efforts the Protected Tactical Enterprise Service (PTES) program which will test the PTW modem over Wideband Global SATCOM (WGS) as well as Protected Tactical SATCOM (PTS), which is the next generation satellite constellation. Funding includes the Network Centric Waveform Tool (NCWT) development and testing and other efforts that have impacts on tactical Army use of military and commercial satellite constellations.

FY 2021 funding also supports continued collaborative development, testing and certification with the Air Force of critical protected tactical capabilities.

MILSATCOM System Engineering (0303142A/456) funding is a realignment of funding from MILSACTOM System Engineering (1203142A/FE2) and Protected Anti-jam Tactical SATCOM (1203142A/FI8).

<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
Current President's Budget	0.000	0.000	18.684	-	18.684
Total Adjustments	0.000	0.000	18.684	-	18.684
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	18.684	-	18.684

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / <i>SATCOM Ground Environment (SPACE)</i>	
<b><u>Change Summary Explanation</u></b> FY 2021 increase reflects funding realignment from SATCOM Ground Environment (SPACE) (1203142A).  Project 253, Dscs-Dcs (Phase II), SATCOM Ground Environment (SPACE): In FY 2021, \$1.241 million in Reimbursable Manpower for this line has been realigned from Reimbursable Civilian Funding to Direct Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments.		

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 253 / Dscs-Dcs (Phase II)
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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
253: Dscs-Dcs (Phase II)	-	0.000	0.000	4.372	-	4.372	4.495	4.556	4.565	4.885	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

1203142A - SATCOM Ground Environment (SPACE) funding has been realigned to 0303142A SATCOM Ground Environment (SPACE) in FY 2021 and out. This is not a new start.

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

Project 253, Dscs-Dcs (Phase II), SATCOM Ground Environment (SPACE) supports the Army's Network Modernization Strategy Line of Effort (LOE) 1 - Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

FY 2021 Base funding in the amount of \$4.372 million develops Satellite Communication (SATCOM) ground subsystem equipment and software in support of Joint Chiefs of Staff (JCS) validated Mission Command Network and Systems requirements for the worldwide Defense Enterprise Wideband SATCOM System (DEWSS). DEWSS is composed of the Super High Frequency (SHF) Defense Satellite Communications System (DSCS) and Wideband Global SATCOM (WGS) programs, which are required to support legacy, interim and emerging communication space architectures and future force requirements. Expansion of the WGS constellation and upgrades to both DSCS and WGS are vital to support the Army's emerging power projection and rapid deployment role. DSCS and WGS provide multiple channels of tactical end-to-end connectivity and interoperability with strategic networks and national decision-makers, satisfying JCS network operations in support of the President, JCS, combatant commanders, military departments, Department of State and other government departments and agencies.

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

	FY 2019	FY 2020	FY 2021
<b>Title:</b> SATCOM Terminal Digital Intermediate Frequency Implementation Analysis	-	-	2.301
<b>Description:</b> SATCOM Terminal Digital Intermediate Frequency (IF) implementation analysis aimed at improving bandwidth efficiency of gateway terminals while providing an additional layer of resiliency through terminal redundancy. These analyses include various evaluations for digital terminal components to replace current, less efficient, analog components. These analyses also include assessment of terrestrial connectivity among SATCOM terminals to enable Continuity Of Operations (COOP) and failover scenarios required for resiliency.			
<b>FY 2021 Plans:</b> Continue to demonstrate SATCOM Gateway resiliency through path diversity; use SATCOM terminals at different geographical locations to support any SATCOM mission.			
<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 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 253 / Dscs-Dcs (Phase II)

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Funding has been realigned from 1203142A - SATCOM Ground Environment (SPACE) to 0303142A SATCOM Ground Environment (SPACE) in FY 2021 and out.			
<b>Title:</b> Electromagnetic Interference Mitigation Analysis	-	-	2.071
<b>Description:</b> Continue to assess multiple interference mitigation/cancellation technologies for effectiveness in improving reliability/resiliency of strategic and tactical communications. Mature technology to software/firmware that will improve protected SATCOM modem/terminal performance in a electro-magnetic interference contested environment. Technology will also improve terminal performance against adversary and friendly satellite link jamming resources.			
<b>FY 2021 Plans:</b> Continue to transition performance specifications to be implemented into next generation SATCOM modem. Mature and demonstrate gateway resiliency by using satellite links and terrestrial connectivity simultaneously to support SATCOM missions.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding has been realigned from 1203142A - SATCOM Ground Environment (SPACE) to 0303142A SATCOM Ground Environment (SPACE) in FY 2021 and out.			
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	4.372

<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>
• BB8500: Defense Enterprise Wideband Satcom Systems	96.633	98.399	101.498	-	101.498	110.890	105.871	101.438	97.156	Continuing	Continuing

**Remarks**  
In FY 2021, \$1.241 million in Reimbursable Manpower for this line has been realigned from Reimbursable Civilian Funding to Direct Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments.

**D. Acquisition Strategy**  
This finances Project Manager, Defense Communications and Army Transmission Systems (PM DCATS) netcentric systems engineering, modem risk mitigation, and risk management framework support. Funding provides for SATCOM terminal upgrades, enhancement of baseband throughput capabilities, technology insertion and upgrades which improves SATCOM gateway resiliency while allowing for full utilization of Wideband Global SATCOM (WGS) capabilities. Both the Wideband SATCOM Operational Management System (WSOMS) and the Enterprise Wideband SATCOM Terminal System (EWSTS) Capability Production Documents (CPDs) contain Netcentric-Ready Key Performance Parameters (NR-KPPs) as required by CJCSI 6212.01C. Netcentric efforts are required to facilitate the migration from the current trunk-based communications systems to Internet Protocol (IP) based systems and to engineer, test and integrate IP based capabilities into WSOMS and EWSTS

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 253 / Dscs-Dcs (Phase II)

systems. Studies, risk mitigation, system integration and advanced demonstrations for Netcentric baseband and policy based control will accommodate technology insertion, data sharing, remote operations, architecture efforts and use of commercial technology, thus ensuring the life of the Defense Enterprise Wideband Satellite System (DEWSS) terminal family beyond 2025 and reducing lifecycle costs and enterprise requirements on the WGS and Defense Satellite Communication System (DSCS) satellites in the future. Contracting approach for new technology is through the use of Broad Agency Announcements (BAA) and Other Transaction Authority (OTA) contracts.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 253 / Dscs-Dcs (Phase II)
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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			
SATCOM Terminal Digital IF Implementation Analysis	MIPR	Aberdeen Proving Ground : MD	-	-		-		1.970	Jan 2021	-		1.970	Continuing	Continuing	Continuing
Electromagnetic Interference Mitigation Analysis	MIPR	Aberdeen Proving Ground : MD	-	-		-		1.741	Jan 2021	-		1.741	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	-		-		3.711		-		3.711	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			
In-house Support	Allot	PdM WESS : Ft. Belvoir, VA	-	-		-		0.060		-		0.060	Continuing	Continuing	Continuing
Contractor Support	C/CPFF	ACC : Rock Island, IL	-	-		-		0.601	Jan 2021	-		0.601	Continuing	Continuing	Continuing
<b>Subtotal</b>			-	-		-		0.661		-		0.661	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	4.372	-	4.372	Continuing	Continuing	N/A

**Remarks**  
 There are no Digital IF transitions in FY21, only demonstrations.

SATCOM Terminal Digital Intermediate Frequency (IF) demonstrations with multi-vendor equipment will be conducted using live satellite links between Tobyhanna Army Depot (TYAD) and Joint SATCOM Engineering Center (JSEC) at Aberdeen Proving Grounds. All components demonstrated will be at Technology Readiness Level (TRL) 6.

Electromagnetic Interference Algorithms at TRL 6 will be hosted on a stand-alone hardware platform and tested at JSEC using live satellite links. All verified algorithms and performance specifications will transition to the Next Generation Frequency Division Multiple Access (FDMA) modem program during 4Q FY 2021.



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 253 / Dscs-Dcs (Phase II)	

Event Name	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
SATCOM Terminal Digital Intermediate Frequency (IF) Implementation Analysis																												
Electromagnetic Interference Mitigation Analysis																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 253 / Dscs-Dcs (Phase II)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SATCOM Terminal Digital Intermediate Frequency (IF) Implementation Analysis	1	2021	4	2025
Electromagnetic Interference Mitigation Analysis	1	2021	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)				<b>Project (Number/Name)</b> 456 / MILSATCOM System Engineering			
<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>
456: MILSATCOM System Engineering	-	0.000	0.000	14.312	-	14.312	17.212	12.411	10.717	9.717	0.000	64.369
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

This is not a new start program.

Military Satellite Communications (MILSATCOM) System Engineering (0303142A/456) is a continuation of efforts previously funded by the Army under PE 1203142A - SATCOM Ground Environment (SPACE) MILSATCOM System Engineering (FE2) and Protected Anti-jam Tactical SATCOM (FI8).

Previous funds under MILSATCOM Systems Engineering (1203142A/FE2) supported development and testing of prototype Protected Tactical Waveform (PTW) modems and Protected Tactical Satellites (PTS) during the Protected Tactical Service Field Demo (PTSFD) (FY 2019).

Previous funds under the Protected Anti-jam Tactical SATCOM (1203142A/FI8) supported initial development, testing, and certification of production representative PTW modems, incorporating the Army specific requirements to support continued spiral development of critical protected communications capabilities to address resiliency in jamming environments.

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

This funding line supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network Cross-Functional Team capability set approach to achieve the network modernization strategy.

MILSATCOM System Engineering assures the tactical Army satellite communications (SATCOM) and SATCOM On-the-Move (SOTM) systems are engineered to legally and efficiently operate worldwide. MILSATCOM System Engineering shapes Joint SATCOM systems' design efforts, standards development and planning processes. MILSATCOM System Engineering represents the Army's tactical interests within DoD, Commercial and International forums to ensure affordable and scalable future SATCOM capabilities for maneuver forces. These efforts ensure that the Army continues to evaluate evolving technologies for the planning and designing of SATCOM solutions that reduce technical and programmatic impacts.

MILSATCOM System Engineering includes Protected Anti-jam Tactical SATCOM efforts, which fill a critical communications gap for anti-jam SATCOM capability for mobile ground forces conducting expeditionary operations in electronically contested environments. It provides the ability for the tactical Army to be resilient in a contested environment and protect against catastrophic loss of situational awareness and command and control during critical battle movement. It will offer the tactical Army protection against interference that is either intentional or unintentional. These efforts are synchronized with the Air Force and DoD's plans for Protected Tactical Waveforms (PTW) on Wideband Global SATCOM (WGS), the Protected Tactical Satellite (PTS), and commercial SATCOM systems.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 456 / MILSATCOM System Engineering
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Protected Anti-jam Tactical SATCOM is a continuation of efforts previously funded under the MILSATCOM System Engineering (1203142A/FE2) and Protected Anti-jam Tactical SATCOM (1203142A/FI8) lines. MILSATCOM System Engineering supported development and testing of prototype PTW modems during the Protected Tactical Service Field Demo (PTSFD) in FY 2019. Protected Tactical Anti-jam SATCOM supported initial development, testing and certification of production representative PTW modems, incorporating Army specific requirements, to support continued spiral development of critical protected communications capabilities to address resiliency in jamming environments in FY 2020.

FY 2021 funding supports the systems engineering required to support technology maturation, systems analysis, and planning associated with Joint SATCOM development efforts. This line continues to fund the systems architecture and analysis for current and future SATCOM efforts in both wideband and protected satellite communications. This effort includes collaborative work with the Air Force on the prototype Protected Tactical Waveform (PTW) modem development and testing during the Protected Tactical Service Field Demo (PTSFD). It also funds the system engineering efforts associated with the Protected Tactical Enterprise Service (PTES) program, which will develop, test, and enable PTW communications over Wideband Global SATCOM (WGS) as well as Protected Tactical SATCOM (PTS), which is the next generation satellite constellation.

FY 2021 funding also supports continued collaborative development, testing and certification with the Air Force of critical protected tactical capabilities.

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

	FY 2019	FY 2020	FY 2021
<p><b>Title:</b> Protected communications system engineering and WGS communications</p> <p><b>Description:</b> Provides systems engineering support relating to the technology maturation, development and planning associated with joint SATCOM development efforts including Network Centric Waveform Tool (NCWT), Protected Tactical Field Service Demo (PTSFD), Protected Tactical Enterprise Service (PTES) and Protected Tactical SATCOM (PTS).</p> <p><b>FY 2021 Plans:</b> Funding supports continued systems engineering and analysis for Protected Communications and WGS Communications, as well as development and technology maturation on the NCWT.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase in FY 2021 of \$1.174 million realigns program funding from MILSATCOM System Engineering (1203142A/FE2) to MILSATCOM System Engineering (0303142A/456) beginning in FY 2021.</p>	-	-	1.174
<p><b>Title:</b> Systems architecture and analysis support</p> <p><b>Description:</b> Provides systems engineering support relating to the architecture and analysis of NCWT and the collaborative SATCOM PTSFD, PTES, and PTS efforts as well as other efforts, such as Analysis of Alternatives and bandwidth studies, that have impact on tactical Army use of military and commercial satellite constellations.</p> <p>These efforts have direct impact in reducing technical programmatic risk for the acquisition efforts for tactical Army SATCOM systems using the WGS and Protected constellations.</p>	-	-	2.619

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 456 / MILSATCOM System Engineering

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>FY 2021 Plans:</b> Funding supports continued in house engineering support, contractor support and system architecture and analysis.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase in FY 2021 of \$2.619 million realigns program funding from the MILSATCOM System Engineering (1203142A/FE2) to the MILSATCOM System Engineering (0303142A/456) beginning in FY 2021.</p>			
<p><b>Title:</b> Testing and certification of critical SATCOM and SATCOM On-the-Move communication and network technologies</p> <p><b>Description:</b> Provides testing and certification of the prototype Protected Tactical Waveform (PTW) modem developed during the PTSFD.</p> <p><b>FY 2021 Plans:</b> Funding supports continued testing and certification of critical SATCOM and SOTM communication and network technologies.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase in FY 2021 of \$.557 million realigns program funding from MILSATCOM System Engineering (1203142A/FE2) to MILSATCOM System Engineering (0303142A/456).</p>	-	-	0.557
<p><b>Title:</b> Protected Tactical Waveform (PTW) Modem Development</p> <p><b>Description:</b> Development of a large form factor and small form factor Protected Tactical Waveform (PTW) modems incorporating Army specific requirements.</p> <p><b>FY 2021 Plans:</b> Funding supports development and engineering of Army specific requirements for the PTW modem that will be utilized for protected tactical communications.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase in FY 2021 of \$9.962 million realigns program funding from Protected Anti-jam Tactical SATCOM (1203142A/FI8) to MILSATCOM System Engineering (0303142A/456).</p>	-	-	9.962
<b>Accomplishments/Planned Programs Subtotals</b>	-	-	14.312

<p><b>C. Other Program Funding Summary (\$ in Millions)</b> N/A</p> <p><b>Remarks</b> FY2020 and prior year funding was aligned to 1203142A/FE2 and 1203142A/FI8</p>
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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 456 / MILSATCOM System Engineering

**D. Acquisition Strategy**

MILSATCOM System Engineering provides advanced systems engineering, research, development, test and evaluation (RDTE) of new and emerging technologies to optimize terminal performance and communications control. Once the technologies are mature and deemed feasible, funding and management responsibility for implementation of the technology will transition to PM Tactical Network and related Programs of Record.

Additionally, MILSATCOM System Engineering will provide RDTE of emerging protected SATCOM technologies to provide resilience and anti-jam protection against electronic warfare (EW), to include denial of geolocation transmissions, secure classified communications in a jamming environment, and a Protected Tactical Waveform (PTW). The program will leverage contracts established by the Air Force beginning in FY 2020.

FY 2021 contract award will support the continued development, testing and certification of a production representative large form factor PTW modem and development. Early development of PTW modems will enable Army preparedness to meet the Air Force's Protected Tactical Enterprise Service (PTES) Initial Operational Capability (IOC) planned for FY 2023.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 456 / MILSATCOM System Engineering
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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 Communications and WGS Communications	TBD	Various : APG, MD	-	-		-		1.174	Jul 2021	-		1.174	0.000	1.174	-
Protected Tactical Waveform (PTW) Modem Development	C/IDDQ	To Be Determined : To Be Determined	-	-		-		9.962	Jun 2021	-		9.962	0.000	9.962	-
<b>Subtotal</b>			-	-		-		11.136		-		11.136	0.000	11.136	N/A

**Remarks**  
Leveraging Air Force competitive Indefinite Delivery Indefinite Quantity (IDIQ) contracts to support PTW modem development, engineering, and testing.

<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			
Engineering (In House)	MIPR	PM WIN-T : APG, MD	-	-		-		1.202	Dec 2020	-		1.202	0.000	1.202	-
Engineering Contractor Support	C/CPFF	PM WIN-T : APG, MD	-	-		-		1.190	Oct 2020	-		1.190	0.000	1.190	-
System Architecture and Analysis	MIPR	CERDEC : APG, MD	-	-		-		0.227	Dec 2020	-		0.227	0.000	0.227	-
<b>Subtotal</b>			-	-		-		2.619		-		2.619	0.000	2.619	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			
Terminal testing & evaluation system engineering	FFRDC	PEO C3T : Various	-	-		-		0.197	Oct 2020	-		0.197	0.000	0.197	-
Test Support	MIPR	CERDEC : APG, MD	-	-		-		0.161	Dec 2020	-		0.161	0.000	0.161	-
Testing, Certification	MIPR	CERDEC : APG, MD	-	-		-		0.199	Dec 2020	-		0.199	0.000	0.199	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 456 / MILSATCOM System Engineering
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Test and Evaluation (\$ 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			
<b>Subtotal</b>			-	-		-		0.557		-		0.557	0.000	0.557	N/A
<b>Project Cost Totals</b>			-	-		0.000		14.312		-		14.312	0.000	14.312	N/A

**Remarks**  
 FY 2021 funding is a realignment from MILSATCOM System Engineering (1203142A/FE2) and Protected Anti-jam Tactical SATCOM (1203142A/FI8).



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 456 / MILSATCOM System Engineering

Event Name	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
Protected Tactical Service Field Demo (PTSFD)																												
Protected Tactical Service Field Demo (PTSFD) Prototype Modem Testing																												
Protected Tactical Enterprise Service (PTES) Development																												
Protected Tactical SATCOM (PTS) Development																												
Network Centric Waveform Tool (NCWT) Development and Testing																												
SATCOM Systems Architecture and Analysis																												
Protected Tactical Waveform (PTW) Modem (Large Form Factor) Development																												
Protected Tactical Waveform (PTW) Modem (Large Form Factor) Testing																												
Protected Tactical Waveform (PTW) Modem (Small Form Factor) Development																												
Protected Tactical Waveform (PTW) Modem (Small Form Factor) Testing																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> 456 / MILSATCOM System Engineering

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Protected Tactical Service Field Demo (PTSFD)	1	2021	1	2022
Protected Tactical Service Field Demo (PTSFD) Prototype Modem Testing	1	2021	1	2021
Protected Tactical Enterprise Service (PTES) Development	1	2021	4	2025
Protected Tactical SATCOM (PTS) Development	1	2021	4	2025
Network Centric Waveform Tool (NCWT) Development and Testing	1	2021	4	2025
SATCOM Systems Architecture and Analysis	1	2021	4	2025
Protected Tactical Waveform (PTW) Modem (Large Form Factor) Development	1	2021	4	2022
Protected Tactical Waveform (PTW) Modem (Large Form Factor) Testing	3	2022	4	2025
Protected Tactical Waveform (PTW) Modem (Small Form Factor) Development	3	2022	2	2025
Protected Tactical Waveform (PTW) Modem (Small Form Factor) Testing	3	2023	4	2026

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303150A / <i>WWMCCS/Global Command and Control 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	-	1.966	2.073	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.039
C86: <i>Army Global C2 System</i>	-	1.966	2.073	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.039

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

Program has no FY 2021 request.

All Fiscal Year 2020 base funding will support Defense Readiness Reporting capabilities. The Defense Readiness Reporting System-Army (DRRS-A) is the Army's Authoritative Readiness Reporting System. This information technology system provides unit readiness reporting, unit registration and force planning and projection activities to enable Title 10 reporting to Congress. Specifically this funding will provide additional system enhancements and testing to support emerging developmental requirements to satisfy the Army's and Joint readiness reporting capabilities along with ensuring interoperability of Army and Joint Systems. DRRS-A is the Army's critical enabler which directly enables the Quarterly Readiness report to Congress.

Global Command and Control System-Army (GCCS-A): This project is the Army component of the Global Command and Control System (GCCS) Family of Systems (FoS). GCCS-A has transitioned into sustainment.

Army Joint and Strategic Command and Control (AJaSC2) is a modernization development effort for the Army's joint and strategic C2 capabilities. AJaSC2 provides the materiel solution in response to the Army Mission Command for Unified Action Capability Definition Package (AMCUA CDP). AJaSC2 enables Army operational headquarters to integrate with the Joint Force Commands and Unified Action Partners (UAP). AJaSC2 provides Army leaders: Joint Common Operating Picture (COP); Adaptive planning and execution capabilities for distributed, synchronous and asynchronous collaboration services to develop, revise, and execute their warfighting plans supported by theaterwide analytics; strategic Situational Awareness (SA) to coalition operations and other mission partners and Coordination and synchronization of Joint Execution Mission Management.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0303150A / <i>WWMCCS/Global Command and Control System</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	2.031	2.073	2.110	-	2.110
Current President's Budget	1.966	2.073	0.000	-	0.000
Total Adjustments	-0.065	0.000	-2.110	-	-2.110
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.065	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-2.110	-	-2.110

**Change Summary Explanation**

GCCS-A has transitioned into sustainment.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303150A / WWMCCS/Global Command and Control System	<b>Project (Number/Name)</b> C86 / Army Global C2 System
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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
C86: Army Global C2 System	-	1.966	2.073	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.039
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

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

Program has no FY 2021 funding request.

All Fiscal Year 2020 base funding will support Defense Readiness Reporting capabilities. The Defense Readiness Reporting System-Army (DRRS-A) is the Army's Authoritative Readiness Reporting System. This information technology system provides unit readiness reporting, unit registration and force planning and projection activities to enable Title 10 reporting to Congress. Specifically this funding will provide additional system enhancements and testing to support emerging developmental requirements to satisfy the Army's and Joint readiness reporting capabilities along with ensuring interoperability of Army and Joint Systems. DRRS-A is the Army's critical enabler which directly enables the Quarterly Readiness report to Congress.

Global Command and Control System-Army (GCCS-A): This project is the Army component of the Global Command and Control System (GCCS) Family of Systems (FoS). GCCS-A will transition into sustainment in FY 2019.

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

	FY 2019	FY 2020	FY 2021
<p><b>Title:</b> Defense Readiness Reporting System (DRRS-A) - Software Enhancements (Design/Develop)</p> <p><b>Description:</b> Support to design, develop, and deploy emerging requirements into the Army's authoritative readiness reporting system to include. Software enhancements to support evolving DoD and Army readiness policies, processes, technical standards and new interface and interoperability requirements needed to share Army authoritative readiness data with Joint and Army data sharing partners.</p> <p><b>FY 2020 Plans:</b> Will continue support to design, develop, and deploy emerging requirements into the Army's authoritative readiness reporting system to include: Software enhancements to support evolving DoD and Army readiness policies, processes, technical standards and new interface and interoperability requirements needed to share Army authoritative readiness data with Joint and Army data sharing partners.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Program has no FY 2021 program request.</p>	1.658	0.990	-
<p><b>Title:</b> Defense Readiness Reporting System (DRRS-A) - Test and Integration</p>	0.308	0.989	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303150A / WWMCCS/Global Command and Control System	<b>Project (Number/Name)</b> C86 / Army Global C2 System

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> Support for developmental and interoperability testing required for the Army's authoritative readiness reporting system.</p> <p><b>FY 2020 Plans:</b> Will continue developmental and interoperability testing.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Program has no FY 2021 program request.</p>			
<p><b>Title:</b> FY 2020 SBIR/STTR Transfer</p> <p><b>Description:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638</p>	-	0.094	-
<b>Accomplishments/Planned Programs Subtotals</b>	1.966	2.073	-

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

N/A

**Remarks**

**D. Acquisition Strategy**

The Readiness Reporting development effort in FY 2020 is accomplished through a Cost Plus Fixed Fee contract with Sotera Defense Solutions Inc. and testing is managed at the Army Software Engineering Center at Aberdeen Proving Grounds, Maryland. This project will satisfy readiness reporting requirements from Army Readiness Division (DAMO-ODR). The acquisition approach consists of a support agreement with CECOM LCMC SEC as the prime software developer utilizing a mix of government and contractor support.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303150A / WWMCCS/Global Command and Control System	<b>Project (Number/Name)</b> C86 / Army Global C2 System
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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 Office Management (GCCS-A)	Various	Various : Various Locations	16.088	-		-		-		-		-	0.000	16.088	15.805
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.094		-		-		-	0.000	0.094	-
<b>Subtotal</b>			16.088	-		0.094		-		-		-	0.000	16.182	N/A

<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			
Defense Readiness Reporting System-Army Software Development	Option/CPFF	Software Engineering Center : APG, MD	14.820	1.593	Mar 2019	0.990	Mar 2020	-		-		-	0.000	17.403	10.217
GCCS-A/DRRS-A Bridge Effort Software Development (GCCS-A)	MIPR	Software Engineering Center : APG, MD	17.845	-		-		-		-		-	0.000	17.845	4.893
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	0.065		-		-		-		-	0.000	0.065	-
<b>Subtotal</b>			32.665	1.658		0.990		-		-		-	0.000	35.313	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 Contractors (GCSS-A)	C/FP	Various : Various	17.499	-		-		-		-		-	0.000	17.499	17.333
<b>Subtotal</b>			17.499	-		-		-		-		-	0.000	17.499	N/A





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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303150A / WWMCCS/Global Command and Control System	<b>Project (Number/Name)</b> C86 / Army Global C2 System

Event Name	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 of Defense Readiness Reporting System - Army	DRRS-A Modernization																											
DRRS-A Testing	Testing Events																											
DRRS-A Event 1	1 DRRS-A Testing and Release																											
DRRS-A Event 2	2 DRRS-A Testing and Release																											
DRRS-A Event 3	3 DRRS-A Testing and Release																											
DRRS-A Event 4	4 DRRS-A Testing and Release																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0303150A / <i>WWMCCS/Global Command and Control System</i>	<b>Project (Number/Name)</b> C86 / <i>Army Global C2 System</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Modernization of Defense Readiness Reporting System - Army	1	2018	4	2020
DRRS-A Testing	3	2019	3	2019
DRRS-A Event 1	3	2019	3	2019
DRRS-A Event 2	4	2019	4	2019
DRRS-A Event 3	3	2020	3	2020
DRRS-A Event 4	4	2020	4	2020

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

<b>Appropriation/Budget Activity</b>					<b>R-1 Program Element (Number/Name)</b>							
2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>					PE 0305172A / <i>Combined Advanced 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>
Total Program Element	-	1.500	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.500
XT9: <i>Combined Advanced Applications</i>	-	1.500	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.500

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

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).

<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	1.500	0.000	0.000	-	0.000
Current President's Budget	1.500	0.000	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305179A / <i>Integrated Broadcast Service (IBS)</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	-	0.450	0.459	0.467	-	0.467	0.500	0.000	0.000	0.000	0.000	1.876
EF4: <i>Integrated Broadcast System</i>	-	0.450	0.459	0.467	-	0.467	0.500	0.000	0.000	0.000	0.000	1.876

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

The Joint Program Office (JPO) for Integrated Broadcast Service (IBS) Terminals supports the Joint Services and the Special Operations Command (SOCOM). The IBS transmits worldwide time-sensitive tactical and strategic intelligence and targeting data to all echelons of Joint Service operational users. The JPO is responsible for coordinating modernization and sustainment of IBS terminals compatible with the Ultra High Frequency (UHF) SATCOM IBS broadcasts. The JPO is pursuing a next generation non-developmental item to replace the existing Joint Tactical Terminals (JTT). The transmit/receive-capable JTT systems currently consist of the JTT-Senior and JTT-IBS configurations, and they satisfy the radio communication Key Performance Parameters for the IBS Program. The JTT is the official IBS producer system, and ensures continued IBS interoperability to a variety of tactical producers/consumers across the Joint Services.

<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	0.450	0.459	0.467	-	0.467
Current President's Budget	0.450	0.459	0.467	-	0.467
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0305179A / <i>Integrated Broadcast Service (IBS)</i>				<b>Project (Number/Name)</b> EF4 / <i>Integrated Broadcast 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>
EF4: <i>Integrated Broadcast System</i>	-	0.450	0.459	0.467	-	0.467	0.500	0.000	0.000	0.000	0.000	1.876
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Joint Program Office (JPO) for Integrated Broadcast Service (IBS) Terminals supports the Joint Services and the Special Operations Command (SOCOM). The IBS transmits worldwide time-sensitive tactical and strategic intelligence and targeting data to all echelons of Joint Service operational users. The JPO is responsible for coordinating modernization and sustainment of IBS terminals compatible with the UHF SATCOM IBS broadcasts. The JPO is pursuing a next generation non-developmental item to replace the existing Joint Tactical Terminals (JTT) and performs JTT life cycle program management and technical fixes. The IBS network uses Type-1 encryption, Common Interactive Broadcast (CIB), and Common Message Format (CMF). Funds support acquisition related technical development, requirements, interoperability, testing and integration of next generation JTT systems and components.

FY 2021 funds in the amount of \$0.467 million will be used for government testing, integration and certification for the modernized JTT.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Support Costs and Management Services	0.448	0.459	0.467
<b>Description:</b> Testing support			
<b>FY 2020 Plans:</b> Continued system engineering support.			
<b>FY 2021 Plans:</b> Will continue testing support.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase due to inflation.			
<b>Title:</b> MDAP Support	0.002	-	-
<b>Description:</b> Cost Overrun support			
<b>Accomplishments/Planned Programs Subtotals</b>	0.450	0.459	0.467

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305179A / <i>Integrated Broadcast Service (IBS)</i>	<b>Project (Number/Name)</b> EF4 / <i>Integrated Broadcast System</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
• V29600: <i>JTT/CIBS-M (MIP)</i>	9.027	7.686	5.304	-	5.304	5.477	1.805	-	-	0.000	29.299

**Remarks**

FY 2021 funds continue support of the modernized JTT acquisition initiated in FY 2020.

**D. Acquisition Strategy**

The Integrated Broadcast Service (IBS) was designed to consolidate legacy broadcasts into an interoperable set of broadcasts that can carry threat warning and situational data to both users and producers. The requirement for IBS is documented in the Integrated SIGINT Information Mission Needs Statement (MNS) validated by the Joint Requirements Oversight Council (JROC) Memo (JROCM) 115-95 on 15 September 1995. The JTT program is an effort to provide common tactical terminals capable of receiving and transmitting into the IBS UHF broadcasts. The House Permanent Select Committee for Intelligence (HPSCI) requested an IBS Implementation Plan, which was approved by the Assistant Secretary for Defense for Command, Control, Communications and Intelligence (ASD/C3I) (ref (i)) on 24 October 1995. The JTT was included as part of the solution in the Implementation Plan. The JTT program Operational Requirements Document (ORD) was signed on 24 September 1996. Subsequent updates in March 2005 and November 2017 were made to reflect changes in interoperability/Net Readiness certifications and Post Milestone C enhancements respectively. Additional fact of life administrative changes were made and the updated ORD was signed on 25 April 2018. The JTT is integrated into platforms that have a requirement to interact (transmit and/or receive) with the IBS Common Interactive Broadcast (CIB). JTT is a post-Milestone C program. The legacy IBS Terminals will reach sustainment end-of-life in FY2025. The procurement of a post-Milestone C replacement was initiated to replace the end-of-life systems, leverage updated technology, and enable flexible configurations to meet Joint customer operational needs. The procurement for a modernized Non-Developmental Item terminal will access multiple vendors by leveraging competitively awarded contracts.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305179A / <i>Integrated Broadcast Service (IBS)</i>	<b>Project (Number/Name)</b> EF4 / <i>Integrated Broadcast System</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			
User Support	MIPR	ICOE : Fort Huachuca, AZ	0.046	-		-		-		-		-	0.000	0.046	-
Project Management Support	Allot	PM DCGS-A : APG, MD; Fort Huachuca, AZ	0.075	-		-		-		-		-	0.000	0.075	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	Allot	PM DCGS-A : APG, MD	-	0.002		-		-		-		-	0.000	0.002	-
<b>Subtotal</b>			0.121	0.002		-		-		-		-	0.000	0.123	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			
Integration and Testing of JTT fleet Modernization	MIPR	JITC : Fort Huachuca, AZ; APG,MD	0.629	-		0.459		0.467	Jun 2021	-		0.467	0.000	1.555	-
IBS Modernization	MIPR	USAF : Robins AFB, GA	-	0.448		-		-		-		-	0.000	0.448	-
<b>Subtotal</b>			0.629	0.448		0.459		0.467		-		0.467	0.000	2.003	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>		0.750	0.450	0.459	0.467	-	0.467	0.000	2.126	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305179A / <i>Integrated Broadcast Service (IBS)</i>	<b>Project (Number/Name)</b> EF4 / <i>Integrated Broadcast System</i>

Event Name	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
Next Generation IBS Terminals Integration and Test																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305179A / <i>Integrated Broadcast Service (IBS)</i>	<b>Project (Number/Name)</b> EF4 / <i>Integrated Broadcast System</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Next Generation IBS Terminals Integration and Test	2	2020	4	2022

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</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	-	6.000	22.147	4.051	34.100	38.151	4.323	4.240	4.095	0.000	0.000	78.956
11A: <i>Advanced Payload Develop &amp; Spt (MIP)</i>	-	1.252	17.193	0.146	34.100	34.246	0.000	0.000	0.000	0.000	0.000	52.691
123: <i>Joint Technology Center System Integration</i>	-	4.748	4.954	3.905	-	3.905	4.323	4.240	4.095	0.000	0.000	26.265

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

Project 11A Advanced Payload Develop & Spt (MIP): The Advanced Payloads Development project is a shared funding line between multiple payload programs. These payload programs support the Army's transformation by developing Reconnaissance, Surveillance and Target Acquisition (RSTA) and Intelligence, Surveillance and Reconnaissance (ISR) payload systems for Brigade Combat Teams, Divisions, and Corps Unmanned Aircraft Systems (UAS). This is in accordance with Headquarters Department of the Army (HQDA) and Training and Doctrine Command (TRADOC) UAS priorities. Additionally, this Program Element (PE) supports Future Advanced Payloads for Army UAS systems.

Common Sensor Payload (CSP) - Electro Optical / Infrared / Laser Designator (EO/IR/LD) provides High Definition (HD) Full Motion Video (FMV) in both the Electro Optical and Mid Wave IR spectrums with day/night capability to collect and display continuous imagery and the ability to designate targets of interest for attack by laser guided precision weapons. It is the EO/IR/LD sensor for the Gray Eagle UAS which supports force applications, battlespace awareness, force protection, and net-centric operations across the battlefield to provide wide area, near real time RSTA capabilities. Current product improvements continue to focus on the development and implementation of Target Location Accuracy (TLA) and Tactical Awareness Improvement (TAI) capabilities that directly support emerging requirements of the Army's Current and Future Force.

Small TActical Radar - Lightweight (STARLite) provides the Gray Eagle UAS with multi-functional SAR/MTI and Electro-Optic/Infrared (EO/IR) cross-cueing capabilities for the detection, classification and location of stationary and moving vehicle and man-sized targets.

Project 11B: Tactical Signals Intelligence (SIGINT) Payload (TSP) provides the Gray Eagle UAS with radio frequency (RF) emitter detection, recognition, and geo-location capabilities.

Project 123 Joint Technology Center System Integration: The UAS Joint Technology Center/Systems Integration Laboratory (JTC/SIL) is a Joint facility that develops, integrates, and supports the enhancement of its Multiple Unified Simulation Environment (MUSE) capability for Army systems and operational concepts. The JTC/SIL conducts prototype hardware and software development, builds the UAS Institutional Mission Simulator (IMS) trainers for the Shadow, Hunter, and Gray Eagle programs, and provides modeling and simulation support. The MUSE is a real-time, operator in-the-loop simulation that may be integrated with larger simulations in support of Army and Joint training and exercises. The MUSE is also employed as a Mission Rehearsal Tool for ongoing combat operations. This project funds the management of the JTC/SIL and MUSE enhancements. This system supports the Legacy to Objective transition path of the Transformation Campaign Plan (TCP).

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</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	6.000	39.197	39.079	-	39.079
Current President's Budget	6.000	22.147	4.051	34.100	38.151
Total Adjustments	0.000	-17.050	-35.028	34.100	-0.928
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-17.050			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-35.028	34.100	-0.928

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>				<b>Project (Number/Name)</b> 11A / <i>Advanced Payload Develop &amp; Spt (MIP)</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>
11A: <i>Advanced Payload Develop &amp; Spt (MIP)</i>	-	1.252	17.193	0.146	34.100	34.246	0.000	0.000	0.000	0.000	0.000	52.691
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Advanced Payloads Development project is a shared funding line between multiple payload programs. These payload programs support the Army's transformation by developing Reconnaissance, Surveillance and Target Acquisition (RSTA) and Intelligence, Surveillance and Reconnaissance (ISR) payload systems for Brigade Combat Teams, Divisions, and Corps Unmanned Aircraft Systems (UAS). This is in accordance with Headquarters Department of the Army (HQDA) and Training and Doctrine Command (TRADOC) UAS priorities. Additionally, this Program Element (PE) supports Future Advanced Payloads for Army UAS systems.

Common Sensor Payload (CSP) - Acquisition Category (ACAT) III - Electro Optical / Infrared / Laser Designator (EO/IR/LD) provides Standard Definition (SD) or High Definition (HD) Full Motion Video (FMV) in both the Electro Optical and Mid Wave IR spectrums. These systems provide day/night capability to collect and display continuous imagery and the ability to designate targets of interest for attack by laser guided precision weapons. It is the EO/IR/LD sensor for the Gray Eagle UAS which supports intelligence gathering, force applications, battlespace awareness, force protection, and net-centric operations across the battlefield to provide wide area, near real time RSTA capabilities. Fiscal Year (FY) 2021 base dollars in the amount of \$0.146 million and Overseas Contingency Operations (OCO) dollars in the amount of \$34.1 million will fund product improvements to enhance CSP lethality through enhanced Target Location Accuracy (TLA) and usability through Tactical Awareness Improvement (TAI). TLA provides validated, precision geolocation data for real-time targeting by coordinate-seeking weapons, reducing the kill chain timeline from minutes to seconds. TAI provides the warfighter enhanced situational awareness of the battlefield thru full spectrum imaging, aided target recognition, and simultaneous targeting.

Small Tactical Radar - Lightweight (STARLite) provides Gray Eagle UAS multi-functional SAR/MTI and EO/IR cross-cueing capabilities for the detection, classification and location of stationary and moving vehicle and man-sized targets.

**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> STARLite Sensor Processing and Exploitation (SPE)	0.626	-	-	-	-
<b>Description:</b> Software Development to improve STARLite SPE Development, Testing and Integration.					
<b>Title:</b> CSP Increased Usability and Lethality	0.626	17.193	0.146	34.100	34.246
<b>Description:</b> Software and Hardware developments to increase lethality and usability of the CSP while reducing cognitive burden on the Warfighter.					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 11A / <i>Advanced Payload Develop &amp; Spt (MIP)</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><i>FY 2020 Plans:</i></b> Continued TLA development</p> <p><b><i>FY 2021 Base Plans:</i></b> Will continue Night Vision Electronic Sensor Division Lab support for continued technological support to the CSP program.</p> <p><b><i>FY 2021 OCO Plans:</i></b> Will complete TLA developmental and operational testing. Will begin TAI design efforts.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> FY 2021 increases Base funding from \$0.143 million to \$0.146 million to adjust for inflation.</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	1.252	17.193	0.146	34.100	34.246

**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>
• A01005: <i>CSP FMV (MIP)</i>	-	-	0.000	5.968	5.968	-	-	-	-	0.000	5.968

**Remarks**  
Funds in the MQ-1 PAYLOAD - UAS - A00020 Aircraft Procurement, Army (APA) funding line were realigned beginning in FY 2015 into a new shared parent, MQ-1 Payloads (MIP) (SSN A01001). The MQ-1 Payloads (MIP) (SSN A01001) includes the MQ-1 sensor payloads: Synthetic Aperture Radar/Moving Target Indicator (SAR/MTI) (SSN A01003), Signals Intelligence (SIGINT) (SSN A01004), and Common Sensor Payload Full Motion Video (CSP FMV) (A01005).

**D. Acquisition Strategy**

CSP EO/IR/LD enables the Gray Eagle to meet KPP (Key Performance Parameter) requirements. The acquisition strategy for the CSP program was based on a full and open competition for the Army. A competitive contract was awarded in November 2007 to Raytheon for the build, integration, test and delivery of the CSP. Full Rate Production (FRP) was achieved in June 2013. A three (3) year system support contract was awarded in July 2015 for sustainment and upgrade of the CSP to include retrofitting standard definition sensors with high definition sensors and to perform Research Development Technology & Evaluation (RDT&E) activities. The Enhanced EO/IR Capability Production Document, approved 19 December 2016, defines additional KPP requirements for FMV sensors. The first KPP increases detection, recognition, and identification requirements which can only be met with the HD variation of the CSP. Currently, units are being fielded HD CSPs, with additional HD CSPs in production and retrofit. The second KPP requirement is for the CSP to be a metric sensor providing rapid and enhanced TLA. A five (5) year follow-on production and system support contract was awarded in 2019 for integration, test, upgrade, and sustainment of these enhanced capabilities. The FY 2021

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 11A / <i>Advanced Payload Develop &amp; Spt (MIP)</i>
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acquisition strategy for CSP includes the continuation of developmental and operational testing supporting CSP-TLA requirements and the maturation of hardware and software product improvements and prototype development supporting CSP-TAI requirements.

STARLite SAR/MTI is a threshold requirement for the Gray Eagle UAS. The acquisition strategy for STARLite program was based on a full and open competition for the Army. FRP was successfully achieved in June 2013. A follow-on production contract was awarded in April 2014 to procure all remaining STARLite Payloads required for the Gray Eagle platform. STARLite updated its software capabilities based on Initial Operational Test and Evaluation (IOT&E) results. This software update maximized user efficiency through automation of common tasks and upgraded to a common Graphical User Interface (GUI) to align with the Common Operating Environment (COE) requirement to enable Sensor Processing and Exploitation (SPE). The SPE software enhancements simplified user interface, reduced operator workload, and enhanced operator effectiveness. A competitive RDT&E funded contract was awarded to Northrop Grumman in October 2013 to perform trade studies and began the development of the software improvements. Integration onto the Gray Eagle was done via a sole source cost-plus fixed fee contract with the UAS prime contractor, General Atomics ASI.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 11A / <i>Advanced Payload Develop &amp; Spt (MIP)</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			
CSP Program Management	MIPR	PM EOIR : Fort Belvoir, VA	0.822	0.100	Dec 2018	2.217	Dec 2018	0.000		2.261	Dec 2020	2.261	Continuing	Continuing	Continuing
STARLite Program Management	Various	PM SAI : Aberdeen, MD	1.767	0.626	Feb 2019	-		-		-		-	0.000	2.393	-
<b>Subtotal</b>			2.589	0.726		2.217		0.000		2.261		2.261	Continuing	Continuing	N/A

<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			
CSP Development	C/CPFF	Raytheon : McKinney, TX	84.022	-		-		-		-		-	0.000	84.022	-
STARLite Sensor CE Development	SS/CPFF	General Atomics ASI : Poway, CA	2.298	-		-		-		-		-	0.000	2.298	-
CSP HW/SW Improvements Reduce Cognitive Burden	MIPR	Night Vision Labs : Fort Belvoir, VA	4.021	0.426	Mar 2019	-		0.146	Dec 2020	-		0.146	Continuing	Continuing	Continuing
CSP Target Location Accuracy (TLA)	SS/CPFF	Raytheon : McKinney, TX	6.187	-		8.919		0.000		4.718	Dec 2020	4.718	Continuing	Continuing	Continuing
CSP Tactical Awareness Improvement (TAI)	SS/CPFF	Raytheon : McKinney, TX	-	-		-		0.000		11.335	Dec 2020	11.335	Continuing	Continuing	Continuing
CSP TLA Integration	MIPR	Various : Various	-	-		3.755		0.000		1.021	Dec 2020	1.021	Continuing	Continuing	Continuing
CSP TAI Integration	MIPR	Various : Various	-	-		-		0.000		2.292	Dec 2020	2.292	Continuing	Continuing	Continuing
<b>Subtotal</b>			96.528	0.426		12.674		0.146		19.366		19.512	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0305204A / Tactical Unmanned Aerial Vehicles				11A / Advanced Payload Develop & Spt (MIP)							
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
CSP TLA Integration (NRE)	SS/CPFF	PM MAE(General Automics) : San Diego, CA	0.781	-		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.781	-		-		-		-		-	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
CSP Testing	MIPR	Various : Various	17.086	-		-		-		-		-	0.000	17.086	-
CSP HW/SW Improvements Reduce Cognitive Burden	MIPR	Night Vision Labs : Fort Belvoir, VA	0.511	0.100	Mar 2019	-		-		-		-	Continuing	Continuing	Continuing
STARLite YTC Software Development Testing	MIPR	YPG : Yuma Proving Ground	0.910	-		-		-		-		-	0.000	0.910	4.498
STARLite IGE Testing	MIPR	Various : Various	13.441	-		-		-		-		-	0.000	13.441	-
CSP Testing (TLA)	MIPR	Various : Various	-	-		1.732		0.000		6.195	Dec 2020	6.195	Continuing	Continuing	Continuing
CSP Testing (TLA)	SS/CPFF	Raytheon : McKinney, TX	-	-		0.570		0.000		4.450	Dec 2020	4.450	Continuing	Continuing	Continuing
CSP Testing (TAI)	MIPR	Various : Various	-	-		-		0.000		0.914	Dec 2020	0.914	Continuing	Continuing	Continuing
CSP Testing (TAI)	SS/CPFF	Raytheon : McKinney, TX	-	-		-		0.000		0.914	Dec 2020	0.914	Continuing	Continuing	Continuing
<b>Subtotal</b>			31.948	0.100		2.302		0.000		12.473		12.473	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			131.846	1.252		17.193		0.146		34.100		34.246	Continuing	Continuing	N/A
<b>Remarks</b>															



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 11A / <i>Advanced Payload Develop &amp; Spt (MIP)</i>

Event Name	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
CSP HD (EO/IR/LD) Production	[Redacted]				[Redacted]																							
CSP HD Retrofit (Proc)	[Redacted]				[Redacted]																							
CSP HW/SW Improvements Reduce Cognitive Burden Develop	[Redacted]				[Redacted]																							
CSP HW/SW Improvements Reduce Cognitive Burden Testing /	[Redacted]				[Redacted]																							
CSP TLA Development	[Redacted]				[Redacted]																							
CSP TLA PDR/CDR	[Redacted]																											
CSP TLA Test Readiness Review	[Redacted]																											
CSP TLA DT/OT	[Redacted]																											
CSP TLA Production Readiness Review	[Redacted]																											
CSP TLA Retrofit (Proc)	[Redacted]																											
CSP TLA NGA Validation	[Redacted]																											
CSP TAI Development Decision	[Redacted]																											
CSP TAI Development	[Redacted]																											

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 11A / <i>Advanced Payload Develop &amp; Spt (MIP)</i>

Event Name	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
CSP TAI PDR																												
CSP TAI CDR																												
CSP TAI Test Readiness Review																												
CSP TAI DT/OT																												
CSP Production Readiness Review																												
CSP TAI Retrofit (Proc)																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 11A / <i>Advanced Payload Develop &amp; Spt (MIP)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
CSP HD (EO/IR/LD) Production	2	2013	2	2020
CSP HD Retrofit (Proc)	4	2013	3	2020
CSP HW/SW Improvements Reduce Cognitive Burden Development	1	2016	4	2021
CSP HW/SW Improvements Reduce Cognitive Burden Testing / Integration	3	2017	4	2020
CSP TLA Development	4	2018	4	2021
CSP TLA PDR/CDR	1	2020	1	2020
CSP TLA Test Readiness Review	2	2020	2	2020
CSP TLA DT/OT	2	2021	4	2021
CSP TLA Production Readiness Review	1	2022	1	2022
CSP TLA Retrofit (Proc)	1	2022	3	2026
CSP TLA NGA Validation	4	2021	2	2022
CSP TAI Development Decision	4	2020	4	2020
CSP TAI Development	1	2021	3	2023
CSP TAI PDR	4	2021	4	2021
CSP TAI CDR	2	2022	2	2022
CSP TAI Test Readiness Review	4	2022	4	2022
CSP TAI DT/OT	4	2022	3	2023
CSP Production Readiness Review	4	2023	4	2023
CSP TAI Retrofit (Proc)	4	2023	4	2027

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>				<b>Project (Number/Name)</b> 123 / <i>Joint Technology Center 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>
123: <i>Joint Technology Center System Integration</i>	-	4.748	4.954	3.905	-	3.905	4.323	4.240	4.095	0.000	0.000	26.265
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Joint Technology Center/Systems Integration Laboratory (JTC/SIL) is a Joint facility that supports UAS and RPA programs within the Joint Services by providing the system engineering, test and integration, interoperability, rapid technology insertion and develops training capability to include the MUSE/AFSERS system. This project funds the management of the JTC/SIL and MUSE/AFSERS Enhancements

The Multiple Unified Simulation Environment (MUSE) is the DoD simulation/training system for Unmanned Aircraft Systems (UAS), RPA, and ISR systems. MUSE is also known as the Air Force Synthetic Environment for Reconnaissance and Surveillance (AFSERS) in its Air Force Application. The MUSE/AFSERS is a software suite that simulates ISR & strike systems, tailored air vehicle & data links, and visualization systems used for payload product outputs-including Full Motion Video (FMV), Fixed Frame Imagery (FFI), Ground Moving Target Indicator (GMTI) data, and Link 16 (J2.2 and J3.5) tracking messages. Outputs are compliant with applicable DoD standards and are continually tested against actual ground ISR processors to ensure interoperability with over 40 systems within DoD.

The MUSE/AFSERS creates a realistic operational environment which supports the ability to assess military utility, architecture and concept of employment development, Tactics, Techniques, and Procedures (TTP) refinement, practice Processing, Exploitation, and Dissemination (PED) of intelligence information, conduct emerging concepts experimentation, and optimize tactical operations within warfighting exercises and experiments. MUSE/AFSERS is currently in use across Services and most unified commands simulating MQ-1, MQ-9, RQ-4, MQ-1C, M/RQ-5, RQ-7, national and commercial satellite collectors, P-3, E-8, and the U-2. During warfighting exercises, the MUSE/AFSERS provides National Imagery Transmission Format (NITF) images for associated C4ISR systems to support the execution of PED. The MUSE/AFSERS is also used as a mission rehearsal tool for current, on-going military combat operations. Most of the components of the MUSE/AFSERS software suite are also used in multiple UAS RPA system training devices including those for the RQ-7 [Shadow], MQ-1C [Gray Eagle], M/RQ-5 [Hunter], MQ-9 [Medium Altitude Long Endurance Tactical (MALET) JSIL Aircrew Trainer (MJAT)] and RQ-4 [Global Hawk Sensor Operator Part Task Trainer (GHSOPTT) and Global Hawk Weapon System Trainer (WST)].

This system supports the Legacy to Objective transition path of the Transformation Campaign Plan (TCP).

**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> Product Development	4.228	4.354	3.455	-	3.455
<b>Description:</b> Funding is provided for the following efforts planned each Fiscal Year (FY).					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 123 / <i>Joint Technology Center System Integration</i>

**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>
<p><b><i>FY 2020 Plans:</i></b></p> <ul style="list-style-type: none"> <li>- Continued development and release of MUSE/AFSERS RPA and ISR simulation capability supporting theater level exercises such as Dong Maeng (formerly Ulchi Freedom Guardian and Key Resolve), Yama Sakura, Talisman Saber, Pacific Sentry, Austere Challenge, and associated events.</li> <li>- Continued incorporation of mandated Cyber Security updates.</li> <li>- Developed higher fidelity in the Moving Target Indicator payload model into MUSE/AFSERS</li> <li>- Developed and integrated multi-sensor full motion video (FMV) payload simulations to support training missions</li> <li>- Completed the redesign of Connect and Netlink routing software to improve network routing and large data feeds, be web browser accessible, and incorporated the use of Windows Active Directory authentication.</li> <li>- Continued the re-architecture of Vignette Planning &amp; Rehearsal Software (ViPRS) capability.</li> <li>- Continued software architecture optimization and modularization, to facilitate extensibility and scalability.</li> <li>- Extended current Link 16 simulation capabilities to include surface tracks (J3.3).</li> <li>- Conducted an image generator trade study to determine the best image generator to meet USAF training requirements of the future, to include investigating the use of "Gaming Engine" based Image Generation capability such as Unreal4.</li> <li>- Begun development the simulated GPS jamming effects on aircraft systems.</li> <li>- Continued improvement of Moving Target Indicator/Synthetic Aperture Radar payload models into MUSE/AFSERS</li> <li>- Continued integration testing with designated federations (ASCCE, JLVC, JLCCTC) ensuring joint interoperability with services and JS/J7 capabilities.</li> <li>-Development and Integration of Air Launched Effects (ALE) Simulation</li> </ul> <p><b><i>FY 2021 Base Plans:</i></b></p> <ul style="list-style-type: none"> <li>- Continue development and release of MUSE/AFSERS RPA and ISR simulation capability supporting theater level exercises such as Dong Maeng (formerly Ulchi Freedom Guardian and Key Resolve), Yama Sakura, Talisman Saber, Pacific Sentry, Austere Challenge, and associated events.</li> <li>- Continue incorporation of mandated Cyber Security updates.</li> <li>- Complete the re-architecture of Vignette Planning &amp; Rehearsal Software (ViPRS) capability to include transitioning it to be web browser accessible, developing an after action report (AAR) capability, and more realistic attrition.</li> <li>- Continue architecture software optimization and modularization to facilitate extensibility and scalability.</li> <li>-Begin prototype development of an improved image generator based upon the results of the image generator trade study conducted during FY20.</li> </ul>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 123 / <i>Joint Technology Center 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>
- Fully integrate the high fidelity SAR model into the MUSE/AFSERS baseline which provides realistic SAR imagery based upon material encoded terrain. - Fully integrate MTI/SAR sensor cross-cuing capability in MUSE/AFSERS. - Develop and integrate low-cost, fixed-wing support to UAS/RPA operations. - Integrate a Vehicle and Dismount Exploitation Radar (VADER) sensor model in MUSE/AFSERS. - Begin development of the Long Range Radar (LRR) sensor MUSE/AFSERS model. - Development and Integration of Air Launched Effects (ALE) Simulation - Develop IFF Modes 4, 5, & S in MUSE/AFSERS. - Continue integration testing with designated federations (ASCCE, JLVC, JLCCTC) ensuring joint interoperability with services and JS/J7 capabilities.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increase of \$328 from FY 2020 to FY 2021.					
<b>Title:</b> Management Services  <b>Description:</b> Funding is provided for the following efforts.  <b>FY 2020 Plans:</b> Continued coordination and oversight of MUSE product development.  <b>FY 2021 Base Plans:</b> Continue coordination and oversight of MUSE product development.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> \$150K decrease in Program Management funds from FY 2020 to FY 2021	0.520	0.600	0.450	-	0.450
<b>Accomplishments/Planned Programs Subtotals</b>	4.748	4.954	3.905	-	3.905

<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>
• PE 0305206F Air Force: PE 0305206F Air Force	3.480	3.548	3.607	-	3.607	3.680	3.746	-	-	Continuing Continuing

**Remarks**  
The JTC/SIL and the MUSE receive funding from the Air Force, Program Element (PE) 0305206F. This effort is a continuing effort in support of Service UAS programs.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 123 / <i>Joint Technology Center System Integration</i>

**D. Acquisition Strategy**

The acquisition strategy is to continue MUSE development which will be accomplished through a combination of Government in-house functional directorate support using a variety of existing contract vehicles.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0305204A / Tactical Unmanned Aerial Vehicles				123 / Joint Technology Center System Integration							
<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	MIPR	AMC, AMCOM, AMRDEC, SED : Redstone Arsenal, AL	3.519	0.520	Oct 2019	0.600		0.450	Oct 2020	-		0.450	Continuing	Continuing	Continuing
<b>Subtotal</b>			3.519	0.520		0.600		0.450		-		0.450	Continuing	Continuing	N/A
<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
MUSE Development	MIPR	AMC, AMCOM, AMRDEC, SED : Redstone Arsenal, AL	21.271	4.228	Dec 2019	4.354		3.455		-		3.455	Continuing	Continuing	Continuing
<b>Subtotal</b>			21.271	4.228		4.354		3.455		-		3.455	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
Interoperability Support	MIPR	AMC, RDECOM, AMRDEC : Redstone Arsenal, AL	9.460	-		-		-		-		-	0.000	9.460	-
<b>Subtotal</b>			9.460	-		-		-		-		-	0.000	9.460	N/A
<b>Project Cost Totals</b>			34.250	4.748		4.954		3.905		-		3.905	Continuing	Continuing	N/A
<b>Remarks</b>															



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 123 / <i>Joint Technology Center System Integration</i>

Event Name	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
Risk Management Framework: MUSE/AFFERS SW Dev. Kit	[Redacted]																											
Vignette Planning and Rehearsal SW Refactoring(Service Orient	[Redacted]																											
Web Based MUSE/AFSERS	[Redacted]																											
Integration of Night Vision Image Generator (NVIG)	[Redacted]																											
User Interface Redesign	[Redacted]																											
MUSE/AFSERS Releases	[Redacted]																											
Advanced Payload Simulation	[Redacted]																											
Gamming Engine Integration	[Redacted]																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	<b>Project (Number/Name)</b> 123 / <i>Joint Technology Center System Integration</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Windows Entity Server and NetLink Redesign	1	2015	3	2016
Risk Management Framework: MUSE/AFFERS SW Dev. Kit	3	2015	4	2025
Vignette Planning and Rehearsal SW Refactoring(Service Oriented Architecture)	2	2015	4	2021
Incorporate Command and Control Using STANAG 4586	1	2016	3	2017
Generic 6 Degrees of Freedom	1	2017	4	2018
Web Based MUSE/AFSERS	1	2018	4	2019
Integration of Night Vision Image Generator (NVIG)	2	2019	4	2020
User Interface Redesign	1	2015	4	2022
MUSE/AFSERS Releases	3	2015	4	2025
Advanced Payload Simulation	1	2021	4	2025
Gaming Engine Integration	1	2022	4	2023

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / <i>Airborne Reconnaissance 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	-	26.416	13.177	13.283	15.575	28.858	21.386	16.444	21.830	29.224	0.000	157.335
EH2: <i>EMARSS ADV DEV (MIP)</i>	-	3.205	3.218	1.998	-	1.998	2.009	2.049	5.730	18.951	0.000	37.160
EH3: <i>EMARSS Payloads ADV DEV (MIP)</i>	-	6.531	5.959	6.290	-	6.290	6.486	6.616	6.936	7.006	0.000	45.824
EH5: <i>ARL Payloads ADV DEV (MIP)</i>	-	15.980	2.000	0.999	15.575	16.574	8.495	7.779	9.164	3.267	0.000	63.259
EH7: <i>Guardrail Common Sensor (GRCS) Payloads (MIP)</i>	-	0.700	2.000	3.996	-	3.996	4.396	0.000	0.000	0.000	0.000	11.092

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

The Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS) is the Army's newest generation C-12 based, direct support, manned airborne intelligence collection, processing, and targeting support system. It provides a persistent capability to detect, locate, classify/identify, and track surface targets with a high degree of timeliness and accuracy. EMARSS is assigned to the United States (U.S.) Army Intelligence and Security Command (INSCOM) Aerial Exploitation Battalions, providing Aerial Intelligence, Surveillance and Reconnaissance support to combatant commanders. EMARSS is also assigned to the United States Army Training and Doctrine Command (TRADOC) in support of training at the US Army Intelligence Center of Excellence (USAICoE). The Army Acquisition Objective for EMARSS is 36 systems, with an Army Procurement Objective of 24, to include the following variants: eight (8) EMARSS-G (Geo-INT); four (4) EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight (8) EMARSS-M (Multi-INT); and four (4) EMARSS-S (SIGINT). Budget Item Justification is addressed in each Project.

Airborne Reconnaissance Low - Enhanced (ARL-E) is a worldwide self-deployable airborne Intelligence Surveillance Reconnaissance (ISR) system designed for timely, accurate, assured support to tactical forces over the full spectrum of operations. This system is a De Havilland DHC-8 aircraft replacing the DHC-7 in accordance with the Aerial ISR (AISR) 2020 Strategy. ARL-E will enhance the ARL-M sensor capability sets through the procurement of new and refurbished sensors to meet the ARL-E Capabilities Production Document (CPD) requirements. It provides a persistent capability to include: Broad-Area Surveillance and/or Focused Stare on Target Areas of Interest (Point or Objective Targets), Electro-Optical/Infrared (EO/IR)/Full-Motion Video (FMV) , Multi-Mode Radar, Robust Communications Intelligence (COMINT), on-Board Collection, Analysis, Sensor Cross Cue and dissemination through Distributed Common Ground System-Army (DCGS-A) Enabled workstations. ARL-E will be assigned to the U.S. Army Intelligence and Security Command's Aerial ISR Brigade providing AISR support to combatant commanders. For the overall system, the Army Acquisition Objective and the Army Procurement Objective, is nine (9). The Mission Equipment Package (MEP) objective is eight (8). Budget Item Justification is addressed in each Project.

The RC-12X Guardrail Common Sensor (GRCS) is a fixed-wing, airborne COMINT and Electronic Intelligence (ELINT) collection and precision targeting location system. GRCS provides a persistent capability to detect, locate and classify/identify high value targets with a relevant degree of timeliness and accuracy. GRCS is assigned to two (2) U.S. Army INSCOM Aerial Exploitation Battalions providing Aerial Intelligence, Surveillance and Reconnaissance (AISR) support to combatant commanders. The

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / <i>Airborne Reconnaissance Systems</i>
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Army's Acquisition Objective/Army's Procurement Objective is 19 RC-12X; seven (7) fielded to 3rd MI; and seven (7) fielded to the 204th MI, and five (5) trainers within TRADOC and INSCOM. Budget Item Justification is addressed in each Project.

GRCS is the only Army AISR system that currently provides extended range COMINT and ELINT capabilities to support long range targeting of near-peer threats in an A2AD environment.

Research Development Technology & Evaluation (RDT&E) and procurement funding currently planned will address obsolescence issues for critical SIGINT and ELINT capabilities on the GRCS platform. These investments ensure GRCS AISR support in the A2AD environment is not impacted, which would prevent critical intelligence collection at large standoff which is needed to address long range targeting of near-peer threats and maintain system relevancy.

<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	26.416	25.177	13.296	-	13.296
Current President's Budget	26.416	13.177	13.283	15.575	28.858
Total Adjustments	0.000	-12.000	-0.013	15.575	15.562
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-12.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.013	15.575	15.562

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems				<b>Project (Number/Name)</b> EH2 / EMARSS ADV DEV (MIP)			
<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>
EH2: EMARSS ADV DEV (MIP)	-	3.205	3.218	1.998	-	1.998	2.009	2.049	5.730	18.951	0.000	37.160
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS) is the Army's newest generation C-12 based, direct support, manned airborne intelligence collection, processing, and targeting support system. It provides a persistent capability to detect, locate, classify/identify, and track surface targets with a high degree of timeliness and accuracy. EMARSS is assigned to the United States (U.S.) Army INSCOM Aerial Exploitation Battalions, providing Aerial Intelligence, Surveillance and Reconnaissance support to combatant commanders. EMARSS is also assigned to the United States Army Training and Doctrine Command (TRADOC) in support of training at the US Army Intelligence Center of Excellence (USAICoE). The Army Acquisition Objective for EMARSS is 36 systems, with an Army Procurement Objective of 24, to include the following variants: eight (8) EMARSS-G (Geo-INT); four (4) EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight (8) EMARSS-M (Multi-INT); and four (4) EMARSS-S (SIGINT).

This funding line supports non-recurring engineering (NRE), development of type certificates (TC), testing, integration of Modifications in Service of Army Aerial, Intelligence, Surveillance and Reconnaissance (AISR) systems and engineering analysis/studies/structural modifications to substantially increase EMARSS (King Air B300) payload capacity and time on station. Funding provides for the integration of Department of Defense (DoD) mandated safety equipment to meet current and evolving International Standards. It also enhances aircraft communications, navigations and surveillance (CNS); aircraft survivability equipment (ASE) and the integration of the AISR mission equipment package (MEP) as well as obsolescence issues and commonality with the EMARSS Program of Record (POR) aircraft.

**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> Non-Recurring Engineering	3.205	3.218	1.998	-	1.998
<b>Description:</b> This funding line supports non-recurring engineering (NRE), development of type certificates (TC), testing, integration of Modifications in Service of Army Aerial, Intelligence, Surveillance and Reconnaissance (AISR) systems and engineering analysis/studies/structural modifications to substantially increase EMARSS (King Air B300) payload capacity and time on station. Funding provides for the integration of Department of Defense (DoD) mandated safety equipment to meet current and evolving International Standards. It also enhances aircraft communications, navigations and surveillance (CNS); aircraft survivability equipment (ASE) and the integration of the AISR mission equipment package (MEP) as well as obsolescence issues and commonality with the EMARSS Program of Record (POR) aircraft.					
<b>FY 2020 Plans:</b>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH2 / EMARSS ADV DEV (MIP)

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>This funding line supported non-recurring engineering (NRE), development of type certificates (TC), testing, integration of Modifications in Service of Army Aerial, Intelligence, Surveillance and Reconnaissance (AISR) systems and engineering analysis/studies/structural modifications to substantially increase EMARSS (King Air B300) payload capacity and time on station. Funding provided for the integration of Department of Defense (DoD) mandated safety equipment to meet current and evolving International Standards. It also enhanced aircraft communications, navigations and surveillance (CNS), aircraft survivability equipment (ASE), future development for modifications in service, and the integration of the AISR mission equipment package (MEP) as well as obsolescence issues and commonality with the EMARSS Program of Record (POR) aircraft.</p> <p><b>FY 2021 Base Plans:</b> This funding line supports NRE, development of TC, testing and integration of Army AISR systems. Funding provides for the integration of DoD mandated safety equipment to meet current and evolving International Standards. It also enhances aircraft CNS, ASE performance and the integration of the AISR MEP as well as obsolescence issues involved with the transition from QRC to POR in regards to platform survivability equipment such as the Navy AAR-47 changing to Army AAR-57, BFT to BFT-2 and the APX-123 Transponder to APX-119 Transponder.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Successfully completed prior year NRE activities. The \$1.998 million in FY 2021 allows for completion of additional NRE efforts as listed in the FY 2021 Base Plan above.</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	3.205	3.218	1.998	-	1.998

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

Line Item	FY 2019	FY 2020	FY 2021			FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• A02112: EMARSS SEMA Mods (MIP)	60.248	43.139	2.452	26.460	28.912	1.717	1.749	2.180	2.222	Continuing	Continuing
• AZ2054: EMARSS Payloads (MIP)	18.809	12.146	2.174	10.000	12.174	17.757	7.911	10.511	10.813	Continuing	Continuing
• EH3: EMARSS Payloads ADV DEV (MIP)	6.531	5.959	6.290	-	6.290	6.486	6.616	6.936	7.006	0.000	45.824

**Remarks**

The EMARSS Research Development Technology & Evaluation (RDT&E) efforts are found in the following two project lines; 0305206AEH2 EMARSS ADV DEV (MIP) (Fixed Wing Project Office) and 0305206AEH3 EMARSS Payloads ADV DEV (Project Manager Sensors - Aerial Intelligence). The supporting Aircraft Procurement Army

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH2 / EMARSS ADV DEV (MIP)

**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>
(APA lines are A02112 (P-1 Line #25) for Fixed Wing and AZ2054 (P-1 Line #20) for Aerial Intelligence. Separate funding lines support the Army Acquisition Executive's directive, codified in the October 28, 2011 memorandum, to assign overall acquisition lead for manned airborne intelligence systems to Program Executive Officer for Aviation; and overall sensor, processing, exploitation, and dissemination responsibilities to Program Executive Officer for Intelligence, Electronic Warfare, and Sensors.											

**D. Acquisition Strategy**

The acquisition strategy, supported by the EMARSS CPD, is to design, test and field 24 systems as well as provide enhancements to the following sensor capabilities in order to maintain relevancy to the Warfighter: Electro-optical/Infrared (EO/IR)/Full Motion Video (FMV); Communications Intelligence (COMINT); Wide Area Aerial Surveillance (WAAS); Light Imaging Detection and Ranging (LiDAR) and improved Synthetic Aperture Radar / Moving Target Indicator (SAR/MTI) radar; line-of-site (LOS) and beyond line-of-site (BLOS) communications; and Processing Exploitation and Dissemination (PED) supporting two Distributed Common Ground System - Army (DCGS-A) enabled operator workstations. The EMARSS fleet of 24 systems will consist of the following variants: eight (8) EMARSS-G (Geo-INT); four (4) EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight (8) EMARSS-M (Multi-INT); and four (4) EMARSS-S (SIGINT).

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH2 / EMARSS ADV DEV (MIP)
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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			
PMO	RO	FW PO/ PM SAI : Huntsville, AL/ Aberdeen, MD	0.104	0.272	Jan 2019	0.273	Jan 2020	0.160	Jan 2021	-		0.160	0.000	0.809	-
<b>Subtotal</b>			0.104	0.272		0.273		0.160		-		0.160	0.000	0.809	N/A

<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			
Non-Recurring Engineering (OEM Design)/FAA Testing and Certification	SS/CPFF	Textron : Wichita, KS	-	2.933	May 2019	2.945	May 2020	1.838	May 2021	-		1.838	0.000	7.716	-
<b>Subtotal</b>			-	2.933		2.945		1.838		-		1.838	0.000	7.716	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			
Testing	MIPR	AFTD RTC : Eglin, AFB, FL	1.636	-		-		-		-		-	0.000	1.636	-
<b>Subtotal</b>			1.636	-		-		-		-		-	0.000	1.636	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
		Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
<b>Project Cost Totals</b>		1.740	3.205	3.218		1.998		-		1.998	0.000	10.161	N/A

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH2 / EMARSS ADV DEV (MIP)	

Event Name	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
Non-Recurring Engineering (OEM Design)																												
FAA Testing and Certification																												
Army Testing																												
Developmental Initiatives for Performance Enhancements																												

**Note**  
 FY19 \$3.205    FY20 \$3.218    FY21 \$1.998    FY22 \$2.009    FY23 \$2.049    FY24 \$5.730    FY25 \$18.951

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH2 / EMARSS ADV DEV (MIP)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Non-Recurring Engineering (OEM Design)	3	2019	2	2021
FAA Testing and Certification	3	2020	2	2021
Army Testing	3	2021	2	2022
Developmental Initiatives for Performance Enhancements	3	2022	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems				<b>Project (Number/Name)</b> EH3 / EMARSS Payloads ADV DEV (MIP)			
<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>
EH3: EMARSS Payloads ADV DEV (MIP)	-	6.531	5.959	6.290	-	6.290	6.486	6.616	6.936	7.006	0.000	45.824
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS) is the Army's newest generation C-12 based, direct support, manned airborne intelligence collection, processing, and targeting support system. It provides a persistent capability to detect, locate, classify/identify, and track surface targets with a high degree of timeliness and accuracy. EMARSS is assigned to the United States (U.S.) Army Intelligence and Security Command's Aerial Exploitation Battalions, providing Aerial Intelligence, Surveillance and Reconnaissance support to combatant commanders. EMARSS is also assigned to the U.S. Army Training and Doctrine Command (TRADOC) in support of training at the US Army Intelligence Center of Excellence (USAICoE). The Army Acquisition Objective for EMARSS is 36 systems, with an Army Procurement Objective of 24, to include the following variants: eight (8) EMARSS-G (Geo-INT); four (4) EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight (8) EMARSS-M (Multi-INT); and four (4) EMARSS-S (SIGINT).

This funding line supports enhancements to the following sensor capabilities in order to maintain relevancy to the Warfighter: Communications Intelligence (COMINT); Signals Intelligence (SIGINT); Wide Area Aerial Surveillance (WAAS); Light Imaging Detection and Ranging (LiDAR) and improved Synthetic Aperture Radar / Moving Target Indicator (SAR/MTI) Radar; Line-Of-Site (LOS) and Beyond Line-Of-Sight (BLOS) communications; and Processing Exploitation and Dissemination (PED) supporting two Distributed Common Ground System - Army (DCGS-A) enabled operator workstations.

Fiscal Year (FY) 2021 funding in the amount of \$6.290 million continues the development of sensor enhancements through SIGINT software porting and development of new SIGINT software focusing on new signal sets applicable in a near peer environment. This funding also initiates SIGINT architecture development to exploit additional signals of interest relative to MDO, and a SIGINT server leveraging development of other services and facilitating rapid and continuous integration of capabilities targeting emerging signal sets and threats. This SIGINT architecture development work continues through FY 2025.

**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> EMARSS - Sensor Enhancement	5.531	5.577	5.706	-	5.706
<b>Description:</b> Enhancement of EMARSS MDO SIGINT capabilities to decrease target identification time, increase probability of intercept, and increased signal simultaneity. Efforts include the initial development of Advanced LiDAR, software porting and analysis of design of modular open system architecture.					
<b>FY 2020 Plans:</b>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH3 / EMARSS Payloads ADV DEV (MIP)

<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>
Completed preliminary design of Advanced LiDAR. Initiate sensor enhancements to upgrade existing EMARSS sensors. <b>FY 2021 Base Plans:</b> Continue sensor software updates to develop the next generation SIGINT capability and improve performance in a near peer environment to integrate capabilities developed by other programs. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Cost increase from FY 2020 to FY 2021 due to reprioritization towards MDO capabilities.					
<b>Title:</b> EMARSS - Sensor Engineering Support <b>Description:</b> Matrix engineering support for sensor enhancements. <b>FY 2020 Plans:</b> Continued matrix government engineering support for sensor enhancements. <b>FY 2021 Base Plans:</b> Continue matrix government engineering support for sensor enhancements. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Cost increased from FY 2020 to FY 2021 due to estimated increase to rates.	0.563	0.301	0.310	-	0.310
<b>Title:</b> Program Management Support <b>Description:</b> Program Management Office (PMO) support and travel, as well as Systems Engineering and Technical Assistance (SETA) support. <b>FY 2020 Plans:</b> Continued Program Management Office government support and travel as well as SETA support. <b>FY 2021 Base Plans:</b> Continue Program Management Office government support and SETA support. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Cost increased from FY 2020 to FY 2021 due to new contract award and increased support required for sensor enhancement efforts.	0.437	0.081	0.274	-	0.274
<b>Accomplishments/Planned Programs Subtotals</b>	6.531	5.959	6.290	-	6.290

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH3 / EMARSS Payloads ADV DEV (MIP)
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**C. Other Program Funding Summary (\$ in Millions)**

Line Item	FY 2019	FY 2020	FY 2021			FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• A02112: EMARSS SEMA Mods (MIP)	60.248	43.139	2.452	26.460	28.912	1.717	1.749	2.180	2.222	Continuing	Continuing
• AZ2054: EMARSS Payloads (MIP)	18.809	12.146	2.174	10.000	12.174	17.757	7.911	10.511	10.813	Continuing	Continuing
• EH2: EMARSS ADV DEV (MIP)	3.205	3.218	1.998	-	1.998	2.009	2.049	5.730	18.951	0.000	37.160

**Remarks**

The EMARSS Research Development Technology & Evaluation (RDT&E) efforts are found in the following two (2) project lines; 0305206AEH2 EMARSS ADV DEV (MIP) (Fixed Wing Project Office) and 0305206AEH3 EMARSS Payloads ADV DEV (Project Manager Sensors - Aerial Intelligence). The supporting procurement lines are A02112 and AZ2054. Separate funding lines support the Army Acquisition Executive's directive, codified in the October 28, 2011 memorandum to assign overall acquisition lead for manned airborne intelligence systems to Program Executive Officer for Aviation and overall sensor, processing, exploitation, and dissemination responsibilities to Program Executive Officer for Intelligence, Electronic Warfare, and Sensors.

**D. Acquisition Strategy**

The acquisition strategy, supported by the EMARSS CPD, is to provide enhancements to the following sensor capabilities in order to maintain relevancy to the Warfighter: EO/IR FMV; COMINT; WAAS; LiDAR and improved SAR/MTI radar; LOS and BLOS communications; and PED supporting two DCGS-A enabled operator workstations. The EMARSS fleet of 24 systems consists of the following variants: eight EMARSS-G (Geo-INT); four EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight EMARSS-M (Multi-INT); and four EMARSS-S (SIGINT).

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH3 / EMARSS Payloads ADV DEV (MIP)
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<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>			
PMO	C/CR	PEO IEW&S, PM SAI : APG, MD	0.390	0.437	Jan 2019	0.081	Nov 2019	0.274	Nov 2020	-		0.274	Continuing	Continuing	-
<b>Subtotal</b>			0.390	0.437		0.081		0.274		-		0.274	Continuing	Continuing	N/A

<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>			
LiDAR sensor enhancement	SS/CPFF	JHU APL : Laurel, MD	1.500	-		-		-		-		-	0.000	1.500	-
AWAPSS sensor enhancement	C/CPIF	BAE : Nashua, CT	0.200	-		-		-		-		-	0.000	0.200	-
SIGINT sensor enhancement	C/CPFF	CACI/Boeing : APG, MD	0.114	-		-		-		-		-	0.000	0.114	-
SIGINT sensor enhancement	C/CPFF	Lockheed Martin Integrated Systems : Marlton, NJ	0.948	-		-		-		-		-	0.000	0.948	-
Advanced LiDAR Development	SS/CPFF	Johns Hopkins University Applied Physics Laboratory, LLC : Laurel, Md	1.893	5.531	Dec 2018	0.895	Dec 2019	-		-		-	0.000	8.319	-
SIGINT sensor enhancement	C/CPFF	AASKI : Tinton Falls, NJ	-	-		4.682	Feb 2020	5.706	Dec 2020	-		5.706	Continuing	Continuing	-
<b>Subtotal</b>			4.655	5.531		5.577		5.706		-		5.706	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 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>			
Matrix Government Engineering Support	MIPR	USACERDEC, I2WD : APG, MD	0.390	-		0.301	Nov 2019	0.310	Dec 2020	-		0.310	Continuing	Continuing	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH3 / EMARSS Payloads ADV DEV (MIP)
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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
Contractor Engineering Support	C/CPFF	BAH : APG, MD	0.213	0.563	Jan 2019	-		-		-		-	0.000	0.776	-
<b>Subtotal</b>			0.603	0.563		0.301		0.310		-		0.310	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
Engineering Government Testing	MIPR	CFA : Lakehurst, NJ	0.125	-		-		-		-		-	0.000	0.125	-
<b>Subtotal</b>			0.125	-		-		-		-		-	0.000	0.125	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>			5.773	6.531		5.959		6.290	-	6.290	Continuing	Continuing	N/A

**Remarks**

**UNCLASSIFIED**

<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH3 / EMARSS Payloads ADV DEV (MIP)

Event Name	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
QRC to EMARSS POR Modification and Conversion	█				█																							
EMARSS Fielding	█				█																							
Advanced LIDAR Development	█				█																							
Advanced LIDAR Analysis Study	█				█																							
Advanced LIDAR PDR	█				█																							
Sensor Upgrades/Enhancements	█				█				█				█				█				█							



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH3 / EMARSS Payloads ADV DEV (MIP)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
QRC to EMARSS POR Modification and Conversion	2	2015	4	2019
EMARSS Fielding	3	2017	4	2019
Advanced LiDAR Development	2	2018	2	2020
Advanced LiDAR Analysis Study	2	2020	2	2020
Advanced LiDAR PDR	2	2020	2	2020
Sensor Upgrades/Enhancements	2	2020	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems				<b>Project (Number/Name)</b> EH5 / ARL Payloads ADV DEV (MIP)			
<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>
EH5: ARL Payloads ADV DEV (MIP)	-	15.980	2.000	0.999	15.575	16.574	8.495	7.779	9.164	3.267	0.000	63.259
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Airborne Reconnaissance Low - Enhanced (ARL-E) is a worldwide self-deployable airborne Intelligence Surveillance Reconnaissance (ISR) system designed for timely, accurate, assured support to tactical forces over the full spectrum of operations. This system is a De Havilland DHC-8 aircraft replacing the DHC-7 IAW the Aerial ISR (AISR) 2020 Strategy. ARL-E will enhance the ARL-M sensor capability sets through the procurement of new and refurbished sensors to meet the ARL-E Capabilities Production Document (CPD) requirements. It provides a persistent capability to include: Broad-Area Surveillance and/or Focused Stare on Target Areas of Interest (Point or Objective Targets), Electro-Optical/Infrared (EO/IR)/Full-Motion Video (FMV) , Multi-Mode Radar, Robust Communications Intelligence (COMINT), on-Board Collection, Analysis, Sensor Cross Cue and dissemination through Distributed Common System-Army (DCGS-A) Enabled workstations. ARL-E will be assigned to the United States (U.S.) Army Intelligence and Security Command's Aerial ISR Brigade providing AISR support to combatant commanders. For the overall system, the Army Acquisition Objective and the Army Procurement Objective, is nine. The Mission Equipment Package (MEP) objective is eight.

Fiscal Year (FY) 2021 Base funding of \$16.575 million will fund the development of the Long Range Radar Electronic Protection Measure software which will allow the Long Range Radar to support the warfighter in a contested electromagnetic spectrum. This funding line also continues the new signal enhancement development effort to complete Signal 3 and begins the development of software to enhance the COMINT collection capabilities with the lab and flight test for Signal 5 to meet the requirements in the ARL-E CPD.

**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> New Signals (COMINT/Software Upgrades)	15.980	2.000	0.999	15.575	16.574
<b>Description:</b> To develop software for Signals 1, 2, 3, 4, 5, and 6.					
<b>FY 2020 Plans:</b> Fiscal Year (FY) 2020 OCO funding of \$2.000 million continued the new signal enhancement development effort to develop software to enhance the COMINT collection capabilities to see if it meets the requirements in the ARL-E CPD. This funding line supported continued software development to enhance COMINT collection capabilities to effectively prosecute high priority and emerging modern signal emitters.					
<b>FY 2021 Base Plans:</b>					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH5 / ARL Payloads ADV DEV (MIP)

<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 Base funding of \$0.999 million will continue to fund the new signal enhancement development effort to complete Signal 3. This funding line supports continued software development to enhance COMINT collection capabilities to effectively prosecute high priority and emerging modern signal emitters.					
<b><i>FY 2021 OCO Plans:</i></b> FY 2021 OCO funding of \$15.575 million will fund the development of the Electronic Protection Measure software which will allow the sensors to support the warfighter in a contested electromagnetic spectrum. This funding line also continues the new signal enhancement development effort to complete Signal 3 and begins the development of software to enhance the COMINT collection capabilities with the lab and flight test for Signal 5 to meet the requirements in the ARL-E CPD. This funding line supports continued software development to enhance COMINT collection capabilities to effectively prosecute high priority and emerging modern signal emitters.					
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Increase due to FY 2021 Unfunded Requirements (UFRs) funded for New Signals and Radar Electronic Protection Measure efforts.					
<b>Accomplishments/Planned Programs Subtotals</b>	15.980	2.000	0.999	15.575	16.574

<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>
• AZ2050: ARL PAYLOADS (MIP)	86.029	77.895	33.561	45.000	78.561	39.218	36.046	18.324	27.834	Continuing	Continuing
• DX9: National Integration To Tactical Systems(MIP)	9.060	4.490	4.219	-	4.219	5.178	4.421	4.533	6.709	0.000	38.610
• A02109: A02109	12.103	12.294	9.796	-	9.796	-	-	-	-	0.000	34.193
• A02110: ARL SEMA Mods (MIP)	7.522	6.566	9.598	-	9.598	10.338	5.577	6.211	6.422	Continuing	Continuing

**Remarks**  
The ARL-E Research Development Technology & Evaluation (RDT&E) efforts are found in the following two (2) project lines; 0305206AEH4 ARL ADV DEV (MIP) (Fixed Wing Project Office) and 0305206AEH5 ARL Payloads ADV DEV (Project Manager Sensors - Aerial Intelligence). The supporting procurement lines are A02110 and AZ2050. Separate funding lines support the Army Acquisition Executive's directive, codified in the October 28, 2011 memorandum, to assign overall acquisition lead for manned airborne Intelligence systems to Program Executive Officer for Aviation; and overall sensor, processing, exploitation, and dissemination responsibilities to Program Executive Officer for Intelligence, Electronic Warfare, and Sensors.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH5 / ARL Payloads ADV DEV (MIP)

**D. Acquisition Strategy**

ARL-E will enhance the ARL-M sensor capability sets through the procurement of new and refurbished sensors to meet the ARL-E CPD requirements. It provides a persistent capability to include: Broad-Area Surveillance and/or Focused Stare on Target Areas of Interest (Point or Objective Targets), EO/IR FMV, COMINT, on-Board Collection, Analysis, Sensor Cross Cue and dissemination through DCGS-A Enabled workstations. This includes software development to enhance COMINT collection capabilities. The software will be added to existing COMINT systems to effectively prosecute high priority and emerging modern signal emitters.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>											<b>Date:</b> February 2020				
<b>Appropriation/Budget Activity</b> 2040 / 7						<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems					<b>Project (Number/Name)</b> EH5 / ARL Payloads ADV DEV (MIP)				

<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>	<b>Cost</b>			
Program Management	TBD	PM SAI : Aberdeen Proving Ground, MD	-	0.260		-		-		-		-	0.000	0.260	-	
<b>Subtotal</b>			-	0.260		-		-		-		-	0.000	0.260	N/A	

<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>	<b>Cost</b>			
New Signals (COMINT/ Software Upgrades)	C/CPFF	Boeing Argon : Mountain View, CA	26.938	12.030		2.000	Jan 2020	0.999	Jan 2021	11.576	Jan 2021	12.575	0.000	53.543	-	
Radar Electronic Protection Measures	SS/CPFF	Northrup Grumman : Baltimore, MD	-	-		-		0.000		1.799	Nov 2020	1.799	0.000	1.799	-	
<b>Subtotal</b>			26.938	12.030		2.000		0.999		13.375		14.374	0.000	55.342	N/A	

**Remarks**

New Signals Contract: W56KGY-16-D-0001/ 0006. Fiscal Year (FY) 2021 Base funding of \$0.999 million continues the new signal enhancement development effort for Signal 3. This funding line supports continued software development to enhance COMINT collection capabilities to effectively prosecute high priority and emerging modern signal emitters.

New Signals Contract: W56KGY-16-D-0001/ 0006. Fiscal Year (FY) 2021 OCO funding of \$11.576 million continues the new signal enhancement development effort for Signal 3 and starts the Signal 5 software development to enhance the COMINT collection capabilities. This funding line supports continued software development to enhance COMINT collection capabilities to effectively prosecute high priority and emerging modern signal emitters. spectrum.

Radar Development Contract: W56KGY-19-R-LRRV. Fiscal Year (FY) 2021 OCO funding of \$1.799 million starts the development of Radar Electronic Protection Measure software in a contested electromagnetic spectrum.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH5 / ARL Payloads ADV DEV (MIP)
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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 Support to LRR/New Signals (COMINT/Software Upgrades)	C/CPFF	Boeing Argon/ Northrup Grumman : Mountain View, CA/ Baltimore, MD	7.000	3.690		-		0.000		2.000	Jan 2021	2.000	0.000	12.690	-
Radar Electronic Protection Measures	SS/CPFF	Northrup Grumman : Baltimore, MD	-	-		-		0.000		0.200	Nov 2020	0.200	0.000	0.200	-
<b>Subtotal</b>			7.000	3.690		-		0.000		2.200		2.200	0.000	12.890	N/A

**Remarks**  
 New Signals Contract: W56KGY-16-D-0001/ 0006. Fiscal Year (FY) 2021 OCO funding of \$2.000 million completes the lab and flight test for Signal 3 to meet the requirements in the ARL-E CPD.  
 Radar Development Contract: W56KGY-19-R-LRRV. Fiscal Year (FY) 2021 OCO funding of \$0.200 million starts the lab and flight test for Radar Electronic Protection Measure software in a contested electromagnetic spectrum.

	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>	33.938	15.980	2.000	0.999	15.575	16.574	0.000	68.492	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH5 / ARL Payloads ADV DEV (MIP)

Event Name	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	
ARL-E MEP Integration	[Redacted]																[Redacted]				[Redacted]								
ARL-E MEP Integration	[Redacted]																[Redacted]				[Redacted]								
ARL-E System FOT&E	[Redacted]																2	[Redacted]				[Redacted]				[Redacted]			
ARL-E System FOT&E	[Redacted]																2	[Redacted]				[Redacted]				[Redacted]			
ARL-E New Signals Development and Test	[Redacted]																[Redacted]				[Redacted]				[Redacted]				
ARL-E New Signals Development and Test	[Redacted]																[Redacted]				[Redacted]				[Redacted]				
ARL-E Signals 3 and 4 Development and Test	[Redacted]																[Redacted]				[Redacted]				[Redacted]				
ARL-E Signals 3 and 4 Development and Test	[Redacted]																[Redacted]				[Redacted]				[Redacted]				
ARL-E Signal 1 and 2 Development and Test	[Redacted]																[Redacted]				[Redacted]				[Redacted]				
ARL-E Signal 1 and 2 Development and Test	[Redacted]																[Redacted]				[Redacted]				[Redacted]				
ARL-E Signals 5 and 6 Development and Test	[Redacted]																[Redacted]				[Redacted]				[Redacted]				
ARL-E Signals 5 and 6 Development and Test	[Redacted]																[Redacted]				[Redacted]				[Redacted]				
ARL-E Radar Electronic Protection Measures Development	[Redacted]																[Redacted]				[Redacted]				[Redacted]				
ARL-E Radar Electronic Protection Measures Development	[Redacted]																[Redacted]				[Redacted]				[Redacted]				
ARL-E Long Range Radar Development	[Redacted]																[Redacted]				[Redacted]				[Redacted]				
ARL-E Long Range Radar Development	[Redacted]																[Redacted]				[Redacted]				[Redacted]				
ARL-E Long Range Radar Testing	[Redacted]																1	[Redacted]				[Redacted]				[Redacted]			
ARL-E Long Range Radar Testing	[Redacted]																1	[Redacted]				[Redacted]				[Redacted]			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH5 / ARL Payloads ADV DEV (MIP)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ARL-E MEP Contract Award	1	2016	1	2016
ARL-E MEP Integration	1	2016	1	2024
ARL-E System FOT&E	4	2022	4	2022
ARL-E New Signals Development and Test	2	2016	2	2025
ARL-E Signals 3 and 4 Development and Test	2	2016	2	2025
ARL-E Signal 1 and 2 Development and Test	4	2017	4	2020
ARL-E Signals 5 and 6 Development and Test	2	2021	2	2025
ARL-E Radar Electronic Protection Measures Development	1	2021	1	2022
ARL-E Long Range Radar Development	4	2017	3	2019
ARL-E Long Range Radar Testing	3	2019	3	2019



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems				<b>Project (Number/Name)</b> EH7 / Guardrail Common Sensor (GRCS) Payloads (MIP)			
<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>
EH7: Guardrail Common Sensor (GRCS) Payloads (MIP)	-	0.700	2.000	3.996	-	3.996	4.396	0.000	0.000	0.000	0.000	11.092
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Guardrail Common Sensor (GRCS) is an airborne Signals Intelligence (SIGINT) Collection and Location System capable of providing Tactical Commanders Near-Real Time intelligence. It provides a persistent capability to detect, locate and classify/identify critical targets with a relevant degree of timeliness and accuracy. GRCS is assigned to two (2) United States (U.S.) Army Intelligence and Security Command's Aerial Exploitation Battalions, providing Aerial Intelligence, Surveillance and Reconnaissance (AISR) support to combatant commanders. In accordance with the Army's AISR 2020 strategy, the Army's Acquisition Objective/Army's Procurement Objective (AAO/APO) is 19 RC-12X; seven (7) fielded to 3rd MI BN; seven (7) fielded to the 204th MI BN, and five (5) pilot trainers to support Force Generation. The five (5) trainers are not equipped with Primary Mission Equipment (PME).

GRCS Fiscal Year (FY) 2021 Research Development Technology & Evaluation (RDT&E) funding request in the amount of \$3.996 million supports GRCS advanced signal enhancement efforts, development and testing of the signal enhancement infrastructure for GRCS updated SIGINT sensor capabilities. GRCS is the only Army AISR system that currently provides extended range COMINT and ELINT capabilities to support long range targeting of near-peer threats in an A2AD environment. RDTE and procurement funding currently planned will address obsolescence issues for critical SIGINT and ELINT capabilities on the GRCS platform. These investments ensure GRCS AISR support in the A2AD environment is not impacted, which would prevent critical intelligence collection at large standoff which is needed to address long range targeting of near-peer threats and maintain system relevancy.

**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> USFK ONS Development/JICD 4.2 Compliance <b>Description:</b> Development and Testing for Signal Enhancement efforts.	0.700	-	-	-	-
<b>Title:</b> GRCS SIGINT Sensor Upgrades <b>Description:</b> Funding line supports GRCS advanced signal enhancement efforts and software development and testing of signal enhancement infrastructure for GRCS updated SIGINT sensor development. <b>FY 2020 Plans:</b> FY 2020 funding line supported GRCS advanced signal enhancement efforts and software development and testing of signal enhancement infrastructure for GRCS updated SIGINT sensor development. <b>FY 2021 Base Plans:</b>	-	2.000	3.674	-	3.674

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH7 / Guardrail Common Sensor (GRCS) Payloads (MIP)

<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 funding line supports GRCS advanced signal enhancement efforts and software development and testing of signal enhancement infrastructure for GRCS updated SIGINT sensor development. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY 2020 to FY 2021 increase of \$2.0 million to \$4.0 million is due to an increase in efforts for SIGINT upgrades.					
<b>Title:</b> Program Management Support <b>Description:</b> Funds support program management office (PMO) efforts including travel. <b>FY 2021 Base Plans:</b> This FY 2021 funding will support PMO efforts including travel. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> The FY 2020 to FY 2021 increase of is due to an acceleration of SIGINT testing.	-	-	0.322	-	0.322
<b>Accomplishments/Planned Programs Subtotals</b>	0.700	2.000	3.996	-	3.996

<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>
• AZ2052: Guardrail Payloads (MIP)	23.246	25.408	0.129	25.740	25.869	18.979	-	-	26.010	0.000	119.512

**Remarks**

**D. Acquisition Strategy**  
The acquisition strategy is to address obsolescence by providing advanced signal enhancement efforts, software development and testing to the GRCS SIGINT Sensors to extend the useful life through FY 2028. Existing PM SAI contracts to be leveraged.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH7 / Guardrail Common Sensor (GRCS) Payloads (MIP)
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<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>			
USFK ONS Development/ JICD 4.2 Compliance	C/CPFF	PEO IEW&S : Aberdeen Proving Ground, MD	-	0.700	Jan 2019	-		-		-		-	0.000	0.700	0.700
Program Management Support	C/Various	Various : Varous	-	-		-		0.322	Dec 2020	-		0.322	0.000	0.322	-
<b>Subtotal</b>			-	0.700		-		0.322		-		0.322	0.000	1.022	N/A

<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>			
GRCS SIGINT Sensor Enhancements	C/Various	PEO IEW&S : Aberdeen Proving Ground, MD	-	-		2.000	Mar 2020	3.674	Dec 2020	-		3.674	0.000	5.674	2.000
<b>Subtotal</b>			-	-		2.000		3.674		-		3.674	0.000	5.674	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>
-	0.700	2.000	3.996	-	3.996	0.000	6.696	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH7 / Guardrail Common Sensor (GRCS) Payloads (MIP)	

Event Name	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
USFK ONS Development/JICD 4.2 Compliance	[Redacted]				[Redacted]																							
GRCS SIGINT Sensor Enhancements	[Redacted]								[Redacted]																			

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305206A / Airborne Reconnaissance Systems	<b>Project (Number/Name)</b> EH7 / Guardrail Common Sensor (GRCS) Payloads (MIP)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
USFK ONS Development/JICD 4.2 Compliance	1	2019	2	2019
GRCS SIGINT Sensor Enhancements	2	2020	4	2023

**Note**

JICD: Joint Interface Control Document  
 GRCS SIGINT: Guardrail Common Sensor Signals Intelligence

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305208A / <i>Distributed Common Ground/Surface 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	-	27.109	28.821	47.204	-	47.204	40.186	35.355	36.127	5.362	0.000	220.164
D07: <i>DCGS-A Common Modules (MIP)</i>	-	27.109	28.821	47.204	-	47.204	40.186	35.355	36.127	5.362	0.000	220.164

**Note**

The Distributed Common Ground Systems - Army (DCGS-A) was formerly designated a Major Automation Information System (MAIS) program.

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

Distributed Common Ground System - Army (DCGS-A) is the Intelligence, Surveillance and Reconnaissance (ISR) System of Systems (SoS) for Joint, Interagency, Allied, Coalition, and National data analysis, sharing and collaboration. The core functions of DCGS-A are: the vertical and horizontal synchronization of ISR Processing, Exploitation and Dissemination (PED) efforts; operations in a networked environment at multiple security levels; the control of select Army and joint sensor systems; the fusion of all acquired data and information, and distribution of relevant red (threat), gray (non-aligned), and environmental (weather and terrain) information; and providing the Warfighters' early warning, targeting, and sensor ground station capabilities. DCGS-A provides a single integrated ISR ground processing system composed of common components that are interoperable with sensors, other information sources, all Warfighting Functions, compliant with standards providing the Defense Information & Intelligence Enterprise (DI2E) and Intelligence Community Information Technology Enterprise (IC ITE). DCGS-A is fielded in Fixed, Mobile, and embedded configurations emphasizing the use of reach and split based operations by improving accessibility of data in order to reduce forward deployed footprint. As enhanced commercial capabilities are integrated and tested, a continuing series of software capability drop releases will be provided into Army Common/commodity hardware and fielded to units IAW the Army Resourcing Priority List (ARPL) process.

DCGS-A is designated as a Program of Record (PoR) within the Command Post Computing Environment (CPCE) of the Common Operating Environment (COE). DCGS-A provides the Single and Shareable Geospatial Foundation (SSGF) Cross Cutting Capability (CCC), and is defining the DCGS-A architecture to fit within the COE as described by the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA(ALT)) COE Implementation Plan. This is in accordance with the G-3/5/7 priority to align all Army networks, procurements and enhancements under one COE and one vision leveraging intelligence community investments. PM DCGS-A continues to work with PM Mission Command (PM MC) to converge on CP CE Tactical Server Infrastructure (TSI).

DCGS-A provides technologically advanced Processing, Exploitation, and Dissemination (PED) capabilities through iterative software releases delivered in tailored and scalable mobile, fixed, and embedded configurations in all maneuver and maneuver support units from Company Intelligence Support Team to Army Service Component Command, and in select maneuver sustainment units battalion and above.

FY 2021 Base funding in the amount of \$47.204 million for D07, DCGS-A, will be used for modification, testing and integration of commercially available technologies to support multi-source intelligence processing at all echelons, as directed in the FY 2017 National Defense Authorization Act (NDAA), Section 113 and Section 220 that will increase the Tasking, Processing, Exploitation, and Dissemination capability to meet the Army requirements. DCGS-A will focus on Capability Drop upgrades and modifications to prototype and integrate Intelligence Applications into the Command Post Computing Environment (CPCE) and within a cloud computing environment.

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0305208A / Distributed Common Ground/Surface Systems
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Intelligence Applications will begin in FY 2021 with an All-Source Intelligence and collection management capability to streamline and simplify the intelligence process at the tactical echelons, in a fast-paced multi-domain environment. DCGS-A will also begin Next Generation Analytics preparation activities to include market research, studies, and evaluations for the following applications: Open Source (OSINT) applications, Counter Intelligence and Human Intelligence Reporting capabilities (CI/HUMINT), Signals Intelligence (SIGINT) analysis, Intelligence Support to Cyber Operations, and Geospatial analytics capabilities. Activities will include the exploration of Artificial Intelligence and Machine Learning algorithms, and will leverage opportunities for integration into DCGS-A. DCGS-A will also assess solutions to replace the aging Tactical Entity Database with a new database solution at the tactical echelons, fully integrated into CPCE. In FY 2021, DCGS-A will evaluate a new sensor downlink solution to consolidate the capabilities of the legacy Tactical Ground Station, Operational Ground Station, Remote Ground Terminal and AMDAS Dissemination Vehicle onto a single platform with updated commercial technologies and to keep pace with emerging high altitude and space sensor technologies. The program will evaluate Capability Drop-2 solutions and design and develop alternative Industry software solutions to process and fuse space, aerial, and terrestrial sensor data to produce targeting solutions for long-range precision fires.

<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	27.109	38.121	57.250	-	57.250
Current President's Budget	27.109	28.821	47.204	-	47.204
Total Adjustments	0.000	-9.300	-10.046	-	-10.046
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-9.300			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-10.046	-	-10.046

**Change Summary Explanation**

FY21 PB reduction due to prior year performance.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>					<b>Project (Number/Name)</b> D07 / <i>DCGS-A Common Modules (MIP)</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>
D07: <i>DCGS-A Common Modules (MIP)</i>	-	27.109	28.821	47.204	-	47.204	40.186	35.355	36.127	5.362	0.000	220.164
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

The Distributed Common Ground System - Army was formerly designated a Major Automation Information System (MAIS) program.

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

Distributed Common Ground System - Army (DCGS-A) is the Intelligence, Surveillance and Reconnaissance (ISR) System of Systems (SoS) for Joint, Interagency, Allied, Coalition, and National data analysis, sharing and collaboration. The core functions of DCGS-A are: the vertical and horizontal synchronization of ISR Processing, Exploitation and Dissemination (PED) efforts; operations in a networked environment at multiple security levels; the control of select Army and joint sensor systems; the fusion of all acquired data and information, and distribution of relevant red (threat), gray (non-aligned), and environmental (weather and terrain) information; and providing the Warfighters' early warning, targeting, and sensor ground station capabilities. DCGS-A provides a single integrated ISR ground processing system composed of common components that are interoperable with sensors, other information sources, all Warfighting Functions, compliant with standards providing the Defense Information & Intelligence Enterprise (DI2E) and Intelligence Community Information Technology Enterprise (IC ITE). DCGS-A is fielded in Fixed, Mobile, and embedded configurations emphasizing the use of reach and split based operations by improving accessibility of data in order to reduce forward deployed footprint. As enhanced commercial capabilities are integrated and tested, a continuing series of software capability drop releases will be provided into Army Common/commodity hardware and fielded to units IAW the Army Resourcing Priority List (ARPL) process.

DCGS-A is designated as a Program of Record (PoR) within the Command Post Computing Environment (CPCE) of the Common Operating Environment (COE). DCGS-A provides the Single and Shareable Geospatial Foundation (SSGF) Cross Cutting Capability (CCC), and is defining the DCGS-A architecture to fit within the COE as described by the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA(ALT)) COE Implementation Plan. This is in accordance with the G-3/5/7 priority to align all Army networks, procurements and enhancements under one COE and one vision leveraging intelligence community investments. PM DCGS-A continues to work with PM Mission Command (PM MC) to converge on CP CE Tactical Server Infrastructure (TSI).

DCGS-A provides technologically advanced Processing, Exploitation, and Dissemination (PED) capabilities through iterative software releases delivered in tailored and scalable mobile, fixed, and embedded configurations in all maneuver and maneuver support units from Company Intelligence Support Team to Army Service Component Command, and in select maneuver sustainment units battalion and above.

FY 2021 Base funding in the amount of \$47.204 million for D07, DCGS-A, will be used for modification, testing and integration of commercially available technologies to support multi-source intelligence processing at all echelons, as directed in the FY 2017 National Defense Authorization Act (NDAA), Section 113 and Section 220 that will increase the Tasking, Processing, Exploitation, and Dissemination capability to meet the Army requirements. DCGS-A will complete Capability Drop-2 testing and will modernize and integrate intelligence applications into the Command Post Computing Environment (CPCE) and within a cloud computing environment. DCGS-A will



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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	<b>Project (Number/Name)</b> D07 / <i>DCGS-A Common Modules (MIP)</i>
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modernize intelligence applications in FY 2021 beginning with an All-Source intelligence and collection management capability to streamline and simplify the intelligence process at the tactical echelons, in a fast-paced multi-domain environment with CPCE. DCGS-A will also assess solutions to replace the aging Tactical Entity Database with a new database solution at the tactical echelons, fully integrated into CPCE. In FY 2021, DCGS-A will modernize DCGS-A Ground Stations to process and fuse space, aerial, and terrestrial sensor data to produce targeting solutions for long-range precision fires in a multi-domain environment. DCGS-A will also perform risk reduction activities to evaluate replacements for its aging Ground Station platforms in order to align to emerging high altitude and space sensor technologies. DCGS-A will also begin Next Generation preparation activities to include market research, studies, and evaluations for the following: Open Source (OSINT) applications, Counter Intelligence and Human Intelligence Reporting capabilities (CI/HUMINT), Signals Intelligence (SIGINT) analysis, Intelligence Support to Cyber Operations, and Geospatial analytics capabilities. Activities will include the exploration of Artificial Intelligence and Machine Learning algorithms, and will leverage opportunities for integration into DCGS-A.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><b>Title:</b> Integrate and Test Software</p> <p><b>Description:</b> DCGS-A Intelligence applications will issue commercial contracts to vendors on multiple-award contract/s. Initial contract awards will be followed by brief design and develop periods, incorporating maximum Soldier participation and feedback to inform procurement and fielding decisions. Each evaluate, modify (if necessary) and integrate period will result in minor modifications to adapt commercial capabilities for military use through customization, cyber accreditation, and integration with other Army systems.</p> <p><b>FY 2020 Plans:</b> CD 2 is planned to replace DCGS-A data management capabilities hosted at Echelons Above Corps, and adds advanced analytics and Artificial Intelligence/Machine Learning capabilities. Complete integration and testing of CD 2 and start follow on intelligence applications.</p> <p><b>FY 2021 Base Plans:</b> Integrate and test All-Source and Collection Management Applications with CPCE. Complete Integration and Testing of CD2.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Increased software integration and test requirements to complete CD2 and new intelligence applications.</p>	12.600	9.831	11.072	-	11.072
<p><b>Title:</b> Government Matrix Support for Integration</p> <p><b>Description:</b> Matrix Support Government for software integration to the target platforms.</p> <p><b>FY 2020 Plans:</b></p>	3.760	5.130	5.016	-	5.016

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	<b>Project (Number/Name)</b> D07 / <i>DCGS-A Common Modules (MIP)</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 Government Matrix Support for software integration to the target platforms. <b>FY 2021 Base Plans:</b> Continue Government Matrix Support for software integration to the target platforms. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Less support required due to reduced software integration and test requirements.					
<b>Title:</b> Project Management <b>Description:</b> Project Management support to manage the cost, schedule, and performance metrics for the program. <b>FY 2020 Plans:</b> Will continue acquisition document preparation and support for multiple capability drops. <b>FY 2021 Base Plans:</b> Acquisition preparation and support for Next Generation Analytic efforts. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Additional program activities driving increase program management costs.	1.981	3.021	4.992	-	4.992
<b>Title:</b> Army and Joint Interoperability and Operational Testing <b>Description:</b> Testing of DCGS-A <b>FY 2020 Plans:</b> Will continue to support testing requirements for DCGS software. <b>FY 2021 Base Plans:</b> Complete Interoperability and Operational Testing for CD2 and Intelligence Applications: All-Source and Collection Management. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Test costs will be shared with Command Post Computing Environment	5.568	5.110	3.024	-	3.024
<b>Title:</b> Training Development <b>Description:</b> Training support - embedded computer based training (CBT) for the DCGS-A software.	2.851	4.230	1.045	-	1.045

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	<b>Project (Number/Name)</b> D07 / <i>DCGS-A Common Modules (MIP)</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>
<b>FY 2020 Plans:</b> Will continue training support - embedded computer based training (CBT) for the DCGS-A software.					
<b>FY 2021 Base Plans:</b> Continue training support - embedded computer based training (CBT) for the DCGS-A software.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Training support costs will be shared with Command Post Computing Environment					
<b>Title:</b> Logistics Documentation	0.338	1.499	0.990	-	0.990
<b>Description:</b> Logistics activities including maintenance task analysis, level of repair analysis, user manual, training support package, and MANPRINT activities.					
<b>FY 2020 Plans:</b> Will continue logistics activities including task maintenance task analysis, level of repair analysis, user manual, training support package, and MANPRINT activities.					
<b>FY 2021 Base Plans:</b> Continue logistics activities including task maintenance task analysis, level of repair analysis, user manual, training support package, and MANPRINT activities.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Logistics documentation costs will be shared with Command Post Computing Environment					
<b>Title:</b> Ground Station Modernization	-	-	18.094	-	18.094
<b>Description:</b> Ground Station evaluation, modernization, modification, and risk reduction activities.					
<b>FY 2021 Base Plans:</b> Ground Station evaluation, software modification, and risk reduction activities. DCGS-A will also evaluate new designs and replacements for its aging Ground Station platforms to process and fuse space, aerial, and terrestrial sensor data to produce targeting solutions for long-range precision fires.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Legacy Ground Stations require modernization.					
<b>Title:</b> Next Generation Analytics Evaluation	-	-	2.971	-	2.971

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	<b>Project (Number/Name)</b> D07 / <i>DCGS-A Common Modules (MIP)</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>
<b>Description:</b> Next generation analytics market research, studies, evaluate, modify, and integrate experimentation					
<b>FY 2021 Base Plans:</b> Next generation analytics market research studies, evaluate, modify, and integrate experimentation					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Next generation analytics evaluate, modify, and integrate is a new effort.					
<b>Title:</b> MDAP Support	0.011	-	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	27.109	28.821	47.204	-	47.204

<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 Total Cost</b>
• BZ7316: <i>DCGS-A (MIP)</i>	298.270	205.219	151.886	47.709	199.595	163.047	170.928	177.962	191.248	0.000 1,406.269

**Remarks**  
The Distributed Common Ground System - Army is designated a ACAT IAC

**D. Acquisition Strategy**  
The DCGS-A program will consist of multiple capability drops structured to meet DCGS-A User requirements. The DCGS-A program will follow the Information Technology (IT) Box concept for an agile acquisition strategy to iteratively provide and field Intelligence, Surveillance, and Reconnaissance (ISR) capabilities, hosted on Commercial off the Shelf (COTS) equipment/hardware, providing low risk, efficient, time- phased releases of capability to satisfy the Army's operational needs.

The DCGS-A capabilities under Increment 1 will be leveraged to the maximum extent where applicable to meet the future DCGS-A requirements set. The DCGS-A will also leverage the Increment 1 configuration platforms fielded across the Army.

DCGS-A is a collection of software packages (COTS, and GOTS products) selected to provide each Army echelon (from Battalion up to Echelon Above Corps (EAC)) the capability to synthesize and exploit intelligence data. DCGS-A delivers these software packages on COTS and GOTS hardware components, tailored to meet each Army Echelon's intelligence mission requirements. DCGS-A is the Army's ISR Foundation Layer for Tasking, Processing, Exploitation, Dissemination (TPED) and development of situation understanding using intelligence information about the threat, weather, and terrain at all Army Echelons. DCGS-A provides the capabilities necessary for Commanders to access information, task organic sensors, and synchronize non-organic sensor assets with their organic assets. DCGS-A will continuously

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	<b>Project (Number/Name)</b> D07 / <i>DCGS-A Common Modules (MIP)</i>
<p>acquire and synthesize data and information from Joint, Interagency, Intergovernmental, and Multi-national (JIIM) sources to maintain an updated and accurate understanding of the operational environment to inform critical and time sensitive command decisions.</p> <p>The DCGS-A software baseline will be updated and iteratively deployed to address emerging and prioritized operational requirements. PM DCGS-A, in coordination with the operational user community, will align releases with the technological readiness of targeted enhancements, and to support low-risk integration and test cycle times. As requirements are approved, DCGS-A will leverage commercially-available solutions and non-developmental items (NDI) to meet user needs, based on market research results. DCGS-A will issue commercial contracts or conduct NDI technology transitions from DoD Science and Technology organizations, or will re-use NDI from other Army programs, Services, or other Governmental Agencies. The DCGS-A software will be hardware agnostic so that the software can be deployed in any processing hardware equipment. This allows the DCGS-A software to be scalable and deployable in different hardware system configurations, as required by the Army at different echelons. The implementation of the latest COTS hardware procurement through the Army Common Hardware System (CHS) program with the established post-deployment hardware sparing, sustainment, and maintenance provisions, will result in significant cost efficiencies.</p>		

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	<b>Project (Number/Name)</b> D07 / <i>DCGS-A Common Modules (MIP)</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			
Project Management	Allot	DCGS-A : APG, MD	5.949	1.981	Oct 2018	3.021	Oct 2019	4.992	Oct 2020	-		4.992	Continuing	Continuing	-
Milestone preparation; Activities; Trade Space Analysis (TSA)	MIPR	Various : Various	3.318	-		-		-		-		-	0.000	3.318	-
<b>Subtotal</b>			9.267	1.981		3.021		4.992		-		4.992	Continuing	Continuing	N/A

<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			
Integrate & Test software	C/FP	Various : Various	52.722	12.600	Dec 2018	9.831	Dec 2019	11.072	Dec 2020	-		11.072	Continuing	Continuing	Continuing
System reconfiguration	C/FP	Various : Various	4.020	-		-		-		-		-	Continuing	Continuing	-
Ground Station Modernization	C/CPFF	Various : Various	-	-		-		18.094	Feb 2021	-		18.094	Continuing	Continuing	-
Next Generation Analytics Evaluation	C/CPFF	Various : Various	-	-		-		2.971	Feb 2021	-		2.971	Continuing	Continuing	-
<b>Subtotal</b>			56.742	12.600		9.831		32.137		-		32.137	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			
Matrix Support	MIPR	Various : Various	8.835	3.760	Oct 2018	5.130	Oct 2019	-		-		-	Continuing	Continuing	-
Training Development	MIPR	Various : Various	4.519	2.851	Oct 2018	4.230	Oct 2019	1.045	Feb 2021	-		1.045	Continuing	Continuing	-
Logistics Documentation	MIPR	Various : Various	0.785	0.338	Jan 2019	1.499	Jan 2020	0.990	Jan 2021	-		0.990	Continuing	Continuing	-
Government Matrix Support for Integration	MIPR	Various : Various	-	-		-		5.016	Feb 2021	-		5.016	Continuing	Continuing	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	Allot	PM DCGS-A : APG, MD	-	0.011		-		-		-		-	0.000	0.011	-
<b>Subtotal</b>			14.139	6.960		10.859		7.051		-		7.051	Continuing	Continuing	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>													<b>Date: February 2020</b>		
<b>Appropriation/Budget Activity</b> 2040 / 7				<b>R-1 Program Element (Number/Name)</b> PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>						<b>Project (Number/Name)</b> D07 / <i>DCGS-A Common Modules (MIP)</i>					
<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>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Government Test & Integration Lab	MIPR	Various : Various	3.090	5.568	Mar 2019	5.110	Mar 2020	-		-		-	Continuing	Continuing	-
Army and Joint Interoperability & operational Testing	MIPR	Various : Various	-	-		-		3.024	Feb 2021	-		3.024	Continuing	Continuing	-
<b>Subtotal</b>			3.090	5.568		5.110		3.024		-		3.024	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>			83.238	27.109		28.821		47.204		-		47.204	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	<b>Project (Number/Name)</b> D07 / <i>DCGS-A Common Modules (MIP)</i>

Event Name	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
Capability Drop 1	[Redacted]																											
Capability Drop 1 IOC			1																									
Capability Drop 2					[Redacted]																							
Capability Drop 2 IOC					2																							
All-Source Intelligence Application phase 1									[Redacted]																			
All-Source Intelligence Application phase 2													[Redacted]															
Collection Management Applications phase 1									[Redacted]																			
Collection Management Applications phase 2													[Redacted]															
Ground Station Modernization									[Redacted]																			
Next Generation Analytics Market research									[Redacted]																			
Next Generation Analytics Evaluation													[Redacted]															



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	<b>Project (Number/Name)</b> D07 / <i>DCGS-A Common Modules (MIP)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Capability Drop 1	4	2017	3	2019
Capability Drop 1 IOC	3	2019	3	2019
Capability Drop 2	4	2019	1	2021
Capability Drop 2 IOC	2	2021	2	2021
All-Source Intelligence Application phase 1	1	2021	1	2021
All-Source Intelligence Application phase 2	2	2021	1	2023
Collection Management Applications phase 1	2	2021	2	2021
Collection Management Applications phase 2	3	2021	2	2022
Ground Station Modernization	1	2021	2	2022
Next Generation Analytics Market research	1	2021	4	2021
Next Generation Analytics Evaluation	3	2021	2	2023

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0305219A / MQ-1 Gray Eagle UAV
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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	5.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.000
MQ1: MQ-1 Gray Eagle - Army UAV (MIP)	-	0.000	5.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.000

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

FY 2020 funding was an appropriated increase from \$0 requested for "Program increase - additional sensor development".

**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
Current President's Budget	0.000	5.000	0.000	-	0.000
Total Adjustments	0.000	5.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

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

**Project:** MQ1: MQ-1 Gray Eagle - Army UAV (MIP)

Congressional Add: Program increase - additional sensor development

	FY 2019	FY 2020
	-	5.000
Congressional Add Subtotals for Project: MQ1	-	5.000
Congressional Add Totals for all Projects	-	5.000

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305219A / MQ-1 Gray Eagle UAV	<b>Project (Number/Name)</b> MQ1 / MQ-1 Gray Eagle - Army UAV (MIP)
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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
MQ1: MQ-1 Gray Eagle - Army UAV (MIP)	-	0.000	5.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

FY 2020 funding was an appropriated increase from \$0 requested for "Program increase - additional sensor development".

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

	FY 2019	FY 2020
<b>Congressional Add:</b> Program increase - additional sensor development	-	5.000
<b>FY 2020 Plans:</b> Program increase - additional sensor development		
<b>Congressional Adds Subtotals</b>	-	5.000

**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
• A00005: MQ-1 UAV	103.326	144.000	0.000	-	0.000	-	-	-	-	0.000	247.326
• AA6601: Gray Eagle Mods2	189.781	14.699	16.280	-	16.280	10.365	8.580	8.674	-	0.000	248.379
• EB6: MQ-1C Gray Eagle MODS	13.629	9.278	11.688	-	11.688	-	-	-	-	-	Continuing

**Remarks**

**D. Acquisition Strategy**

An Extended Range Multi-Purpose (ERMP) Operational Requirement Document (ORD) was approved by the Joint Requirement Oversight Council (JROC) 6 Apr 2005. Milestone B occurred on 20 Apr 2005, and the System Development and Demonstration contract was awarded 8 Aug 2005, as a result of a competitive solicitation which included a vendor system capabilities demonstration. A Capabilities Production Document (CPD), version 8.7 was approved on 17 Jul 15. MQ-1C Gray Eagle completed FOTE 12 Jun 2015. On 14 Jul 2015, the trigger Configuration Steering Board (CSB) concurred with the Course of Action (COA) to validate the revised requirement for the Echelons Above Division (EAD) Gray Eagle and grant authorities through a new Acquisition Decision memorandum (ADM) to pursue the extended range capable Gray Eagle configuration. MQ-1C Gray Eagle Extended Range is an enhanced derivative of the MQ-1C Gray Eagle UAS and closes the capability gap by delivering extended surveillance coverage which supports Army RSTA missions in excess of 34 hours. MQ-1C Gray Eagle Extended Range's increased performance provides the capacity for multi-intelligence payloads, precision strike capability, and reconnaissance in support of Special Operations Forces (SOF), Mission Command from Aerial Intelligence Brigade (AIB) and U.S. Army Special Operations Command (USASOC). The Gray Eagle Research, Development, Test, and Evaluation (RDTE) acquisition strategy emphasis will be to complete Developmental test events (Environmental, E3, Transportability, software and Air Vehicle Performance Tests) to define and address system risks, followed by an FOTE II for the MQ-1C Gray Eagle Extended Range.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305219A / MQ-1 Gray Eagle UAV	<b>Project (Number/Name)</b> MQ1 / MQ-1 Gray Eagle - Army UAV (MIP)
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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>			
Program increase - additional sensor development	TBD	TBD : TBD	-	-		5.000		-		-		-	0.000	5.000	-
<b>Subtotal</b>			-	-		5.000		-		-		-	0.000	5.000	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>	-	-	5.000	-	-	-	0.000	5.000	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305219A / MQ-1 Gray Eagle UAV	<b>Project (Number/Name)</b> MQ1 / MQ-1 Gray Eagle - Army UAV (MIP)	

Event Name	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
Program increase - additional sensor development																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305219A / MQ-1 Gray Eagle UAV	<b>Project (Number/Name)</b> MQ1 / MQ-1 Gray Eagle - Army UAV (MIP)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Program increase - additional sensor development	2	2020	4	2021

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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0305232A / RQ-11 UAV
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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	-	6.180	3.218	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.398
RA7: RQ-11 Raven (MIP)	-	6.180	3.218	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.398

**Note**

FY 2021 funding has transferred from Program Element (PE) 0305232A RQ-11 UAV to PEs 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) Project BR6 Small Unmanned Aircraft System (6.4) and 0605205A SUAV (6.5) Project BR7 Small Unmanned Aircraft System (6.5).

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

The Rucksack Portable Unmanned Aircraft System (RPUAS) Family of Small Unmanned Aircraft System (FoSUAS) provides battalion and below ground maneuver elements with critical situational awareness and enhanced force protection. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. Other compatible receivers, such as the One System Remote Video Terminal and appropriately equipped manned platforms may also receive the FoSUAS products.

The RPUAS FoSUAS provides the battalion and below ground maneuver elements with an organic, on-demand, asset to develop situational awareness, enhance force protection, and secure routes, points, and areas. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. The RPUAS FoSUAS includes a combination of three separate hand-launched mission specific configurable aircraft that do not require an improved launch/recovery. The three separate mission specific configurable Unmanned Aircraft (UA) are the Short Range Reconnaissance (SRR), the Medium Range Reconnaissance (MRR), and the Long Range Reconnaissance (LRR). In addition to the aircraft, the system contains ground control equipment, which includes an interoperable handheld ground control station (H-GCS) which incorporates the Tactical Open Government Owned Architecture (TOGA). FoSUAS will utilize existing RQ-11 in a system of systems fielding concept, with Short Range Reconnaissance (SRR) and Long Range Reconnaissance (LRR) options under development.

**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	6.180	3.218	3.879	-	3.879
Current President's Budget	6.180	3.218	0.000	-	0.000
Total Adjustments	0.000	0.000	-3.879	-	-3.879
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-3.879	-	-3.879

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0305232A / RQ-11 UAV
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**Change Summary Explanation**

FY 2021 funding has transferred from Program Element (PE) 0305232A RQ-11 UAV to PEs 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) Project BR6 Small Unmanned Aircraft System (6.4) and 0605205A SUAV (6.5) Project BR7 Small Unmanned Aircraft System (6.5).



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0305232A / RQ-11 UAV				<b>Project (Number/Name)</b> RA7 / RQ-11 Raven (MIP)			
<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>
RA7: RQ-11 Raven (MIP)	-	6.180	3.218	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.398
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

FY 2021 funding has transferred from Program Element (PE) 0305232A RQ-11 UAV to PEs 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) Project BR6 Small Unmanned Aircraft System (6.4) and 0605205A SUAV (6.5) Project BR7 Small Unmanned Aircraft System (6.5).

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

The Family of Small Unmanned Aircraft System (FoSUAS) provides battalion and below ground maneuver elements with critical situational awareness and enhanced force protection. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. Other compatible receivers, such as the One System Remote Video Terminal and appropriately equipped manned platforms may also receive the FoSUAS products.

The RPUAS FoSUAS provides the battalion and below ground maneuver elements with an organic, on-demand, asset to develop situational awareness, enhance force protection, and secure routes, points, and areas. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. The RPUAS FoSUAS includes a combination of three separate hand-launched mission specific configurable aircraft that do not require an improved launch/recovery. The three separate mission specific configurable Unmanned Aircraft (UA) are the Short Range Reconnaissance (SRR), the Medium Range Reconnaissance (MRR), and the Long Range Reconnaissance (LRR). In addition to the aircraft, the system contains ground control equipment, which includes an interoperable handheld ground control station (H-GCS), which incorporates the Tactical Open Government Owned Architecture (TOGA). FoSUAS will utilize existing RQ-11 in a system of systems fielding concept, with Short Range Reconnaissance (SRR) and Long Range Reconnaissance (LRR) options under development.

FY 2021 funding has transferred from Program Element (PE) 0305232A RQ-11 UAV to PEs 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) Project BR6 Small Unmanned Aircraft System (6.4) and 0605205A SUAV (6.5) Project BR7 Small Unmanned Aircraft System (6.5).

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Systems Engineering/Program Management (SEPM)	0.380	0.244	-
<b>Description:</b> Systems Engineering and Program Management Support during SRR engineering, integration and preparation of documentation for FRP decision.			
<b>FY 2020 Plans:</b> Will continue Program Management Support for Short Range Reconnaissance Testing activities			
<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 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305232A / RQ-11 UAV	<b>Project (Number/Name)</b> RA7 / RQ-11 Raven (MIP)		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
All remaining funding has been removed from Program Element (PE) 0305232A RQ-11 UAV and can be found on PEs 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) Project BR6 Small Unmanned Aircraft System (6.4) and 0605205A SUAV (6.5) Project BR7 Small Unmanned Aircraft System (6.5).				
<p><b>Title:</b> SRR Developmental Engineering</p> <p><b>Description:</b> SRR Developmental Engineering and integration with H-GCS.</p> <p><b>FY 2020 Plans:</b> Will continue Short Range Reconnaissance (SRR) formerly Short Range Micro (SRM) product validation and integration with the Handheld Ground Control Station in preparation for FRP decision.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> All remaining funding has been removed from Program Element (PE) 0305232A RQ-11 UAV and can be found on PEs 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) Project BR6 Small Unmanned Aircraft System (6.4) and 0605205A SUAV (6.5) Project BR7 Small Unmanned Aircraft System (6.5).</p>		2.800	0.974	-
<p><b>Title:</b> LRR Requirements Decomposition/Systems Engineering/Component Level Projects/Market Research</p> <p><b>Description:</b> Funding provided to initiate the Long Range Reconnaissance prototype materiel baseline</p> <p><b>FY 2020 Plans:</b> Will continue the LRRS prototype materiel baseline.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> All remaining funding has been removed from Program Element (PE) 0305232A RQ-11 UAV and can be found on PEs 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) Project BR6 Small Unmanned Aircraft System (6.4) and 0605205A SUAV (6.5) Project BR7 Small Unmanned Aircraft System (6.5).</p>		2.000	0.750	-
<p><b>Title:</b> SRR Test and Evaluation</p> <p><b>Description:</b> Test and Evaluation of the SRR.</p> <p><b>FY 2020 Plans:</b> Will continue the Development Testing of the SRR.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b></p>		1.000	1.250	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305232A / RQ-11 UAV	<b>Project (Number/Name)</b> RA7 / RQ-11 Raven (MIP)
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
All remaining funding has been removed from Program Element (PE) 0305232A RQ-11 UAV and can be found on PEs 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) Project BR6 Small Unmanned Aircraft System (6.4) and 0605205A SUAV (6.5) Project BR7 Small Unmanned Aircraft System (6.5).			
<b>Accomplishments/Planned Programs Subtotals</b>	6.180	3.218	-

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
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
• A00010: RQ-11 (RAVEN)	46.438	21.420	20.851	-	20.851	16.397	16.581	21.342	21.560	Continuing	Continuing
• 0604101A: Small Unmanned Aerial Vehicle (SUAV) (6.4)	-	-	1.378	-	1.378	1.387	1.392	1.753	1.786	0.000	7.696
• 0605205A: Small Unmanned Aerial Vehicle (SUAV) (6.5)	-	-	5.999	-	5.999	2.407	6.382	9.009	3.018	0.000	26.815

**Remarks**  
FY 2019 funding procures 200 RQ-11B Raven Systems for Security Force Assistance Brigades (SFAB), FY 2020 - 2025 funding procures 2589 SRR systems. RDT&E funding moves to PEs 604101A and 605205A starting in FY2021.

**D. Acquisition Strategy**  
The Product Office will contract utilizing full and open competition via an Other Transaction Agreement (OTA) or a traditional contracting method to host a fly-off and down select. The Government will make contract award based upon competitive source selection criteria.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305232A / RQ-11 UAV	<b>Project (Number/Name)</b> RA7 / RQ-11 Raven (MIP)
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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			
Systems Engineering/ Program Management (SEPM)	RO	PM-TUAS/ AMRDEC : Redstone Arsenal, AL	2.705	0.380		0.244		-		-		-	0.000	3.329	-
<b>Subtotal</b>			2.705	0.380		0.244		-		-		-	0.000	3.329	N/A

<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			
Developmental Engineering 1	C/IDIQ	Various : Various	9.824	-		-		-		-		-	0.000	9.824	-
Developmental Engineering 2	C/IDIQ	AMRDEC : Redstone Arsenal, AL	1.935	-		-		-		-		-	0.000	1.935	-
SRR Prototype Developmental Engineering	TBD	Various : Various	7.850	2.800		0.974		-		-		-	0.000	11.624	-
LRR Requirements Decomposition/Systems Engineering/Component Level Projects/Market Research	TBD	Various : Various	3.000	2.000		0.750		-		-		-	0.000	5.750	-
<b>Subtotal</b>			22.609	4.800		1.724		-		-		-	0.000	29.133	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 1	MIPR	Various : Various	1.046	-		-		-		-		-	0.000	1.046	-
Test and Evaluation 2	MIPR	Various : Various	0.300	-		-		-		-		-	0.000	0.300	-
SRR Test and Evaluation	TBD	Various : Various	0.826	1.000		1.250		-		-		-	0.000	3.076	-
<b>Subtotal</b>			2.172	1.000		1.250		-		-		-	0.000	4.422	N/A

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305232A / RQ-11 UAV	<b>Project (Number/Name)</b> RA7 / RQ-11 Raven (MIP)
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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>	27.486	6.180	3.218	-	-	-	0.000	36.884	N/A

**Remarks**  
All funding has been removed from this PE starting in FY 2021 and can be found on PEs 644101A BR6 and 655205A BR7.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305232A / RQ-11 UAV	<b>Project (Number/Name)</b> RA7 / RQ-11 Raven (MIP)
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Event Name	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
Systems Engineering Program Management (SEPM)																												
SEPM																												
SRR Tranche I OTA Award	 SRR Tranche I OTA																											
SRR Tranche I Prototyping																												
TE																												
Test and Evaluation																												
TE																												
SRR/HGCS Integration																												
SRR/HGCS Int																												
SRR Tranche I End User Assessment					 SRR Tranche II EUA																							
SRR Tranche I Full Rate Production (FRP) Decision					 SRR Tranche I FRP																							
SRR Tranche II OTA Award									 SRR Tranche I OTA																			
SRR Tranche II Prototyping																												
SRR Tranche II End User Assessment													 SRR Tranche II EUA															
SRR Tranche II FRP Decision													 SRR Tranche I FRP															
SRR Tranche III																												
LRR OTA Award (Component)																												
LRR OTA																												

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305232A / RQ-11 UAV	<b>Project (Number/Name)</b> RA7 / RQ-11 Raven (MIP)
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Event Name	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																																								
LRR Prototyping (System)																																																																				
LRR/HGCS Integration																																																																				
LRR End User Assessment																																																																	7 LRR EUA			
LRR Full Rate Production (FRP) Decision																																																																				

**Note**  
Schedule data beyond FY 2020 is for informational purposes. Funding moves to APEs 644101A and 655205A starting in FY 2021.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305232A / RQ-11 UAV	<b>Project (Number/Name)</b> RA7 / RQ-11 Raven (MIP)
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Tactical Open Government Owned Architecture Development	4	2014	4	2014
Tactical Open Government Architecture Test Event 2	3	2015	3	2015
Systems EngineeringProgram Management (SEPM)	2	2018	4	2024
SRR Tranche I OTA Award	3	2019	3	2019
SRR Tranche I Prototyping	3	2019	4	2020
Test and Evaluation	4	2018	4	2024
SRR/HGCS Integration	2	2018	4	2020
SRR Tranche I End User Assessment	3	2020	3	2020
SRR Tranche I Full Rate Production (FRP) Decision	4	2020	4	2020
SRR Tranche II OTA Award	3	2021	3	2021
SRR Tranche II Prototyping	3	2021	3	2022
SRR Tranche II End User Assessment	2	2022	2	2022
SRR Tranche II FRP Decision	3	2022	3	2022
SRR Tranche III	3	2022	2	2024
LRR OTA Award (Component)	3	2021	3	2022
LRR Prototyping (System)	3	2022	1	2025
LRR/HGCS Integration	3	2022	2	2024
LRR End User Assessment	3	2024	3	2024
LRR Full Rate Production (FRP) Decision	2	2025	2	2025

**Note**

All funding after FY 2020 has been removed from this PE and can be found on PEs 0604101A BR6 and 0605205A BR7. Scheduling detail after FY 2020 is for information purposes only.



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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>					<b>R-1 Program Element (Number/Name)</b> PE 0305233A / RQ-7 UAV							
<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	-	17.863	7.817	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	25.680
RQ7: <i>RQ-7 Shadow UAV</i>	-	17.863	7.817	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	25.680

**Note**

Fiscal Year (FY) 2021 funding request has decreased to \$0.

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

The RQ-7Bv2 Shadow Tactical Unmanned Aircraft System (TUAS) provides the Army Brigade Commander with dedicated Reconnaissance, Surveillance and Target Acquisition (RSTA), Intelligence, Battle Damage Assessment (BDA), and Force Protection. In line with the Army's Aviation Restructure Initiative (ARI) three Shadow Platoons are being integrated into the 11 Combat Aviation Brigade (CAB) Apache Reconnaissance Battalions. This will provide Aviation Brigades with Manned-Unmanned-Teaming (MUM-T) and enhanced Aerial Scout capabilities. The RQ-7B Shadow has logged approximately 1,225,000 flight hours, most of which were flown in support of Overseas Contingency Operations (OCO).

The full Shadow system consists of four air vehicles with payload, two Universal Ground Control stations, two Universal Ground Data Terminals, one Portable Ground Control Station with Portable Ground Data Terminal, Ground Support Equipment, two launchers, ten High Mobility Multipurpose Wheeled Vehicles (HMMWVs) with trailer(s), and a Light Medium Tactical Vehicle. Each system is equipped with one Maintenance Section Multifunctional (MSM) and is supported at the division level by Regional Logistics Points. The baseline fielded payload was the electro-optic infrared (EO/IR), but half of those have been replaced with a Laser Designator (LD) payload. An Improved Payload for Shadow, selected by Product Manager Electro-Optic/Infrared (PdM EO/IR), will be integrated and qualified in FY 2019-2020. 110 of 115 Shadow systems required by the Army Acquisition Objective (AAO) have been resourced.

Justification: FY 2021. Zero funding submitted.

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

	<u><b>FY 2019</b></u>	<u><b>FY 2020</b></u>	<u><b>FY 2021 Base</b></u>	<u><b>FY 2021 OCO</b></u>	<u><b>FY 2021 Total</b></u>
Previous President's Budget	17.863	7.817	0.000	-	0.000
Current President's Budget	17.863	7.817	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0305233A / RQ-7 UAV				<b>Project (Number/Name)</b> RQ7 / RQ-7 Shadow UAV			
<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>
RQ7: RQ-7 Shadow UAV	-	17.863	7.817	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	25.680
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Fiscal Year (FY) 2021 funding request has decreased to \$0.

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

The RQ-7Bv2 Shadow Tactical Unmanned Aircraft System (TUAS) provides the Army Brigade Commander with dedicated Reconnaissance, Surveillance and Target Acquisition (RSTA), Intelligence, Battle Damage Assessment (BDA), and Force Protection. In line with the Army's Aviation Restructure Initiative (ARI) three Shadow Platoons are being integrated into the 11 Combat Aviation Brigade (CAB) Apache Reconnaissance Battalions. This will provide Aviation Brigades with Manned-Unmanned-Teaming (MUM-T) and enhanced Aerial Scout capabilities. The RQ-7B Shadow has logged approximately 1,225,000 flight hours, most of which were flown in support of Overseas Contingency Operations (OCO).

The full Shadow system consists of four air vehicles with payload, two Universal Ground Control stations, two Universal Ground Data Terminals, one Portable Ground Control Station with Portable Ground Data Terminal, Ground Support Equipment, two launchers, ten High Mobility Multipurpose Wheeled Vehicles (HMMWVs) with trailer(s), and a Light Medium Tactical Vehicle. Each system is equipped with one Maintenance Section Multifunctional (MSM) and is supported at the division level by Regional Logistics Points. The baseline fielded payload was the electro-optic infrared (EO/IR), but half of those have been replaced with a Laser Designator (LD) payload. An Improved Payload for Shadow, selected by Product Manager Electro-Optic/Infrared (PdM EO/IR), will be integrated and qualified in FY2019-2020. 110 of 115 Shadow systems required by the Army Acquisition Objective (AAO) have been resourced.

Justification: For FY 2021, zero funding request submitted.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Air Vehicle Improvements	3.768	-	-
<b>Description:</b> Air Vehicle Improvements			
<b>Title:</b> Ground Equipment Improvements	7.218	-	-
<b>Description:</b> Ground Equipment Improvements			
<b>Title:</b> Test and Evaluation	3.542	3.427	-
<b>Description:</b> Test and Evaluation			
<b>FY 2020 Plans:</b>			

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305233A / RQ-7 UAV	<b>Project (Number/Name)</b> RQ7 / RQ-7 Shadow UAV
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
Completed Funds Test and Evaluation for the Shadow V2 Block III upgrade			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> For FY 2021, zero funding request submitted.			
<b><i>Title:</i></b> System Engineering/Program Management	1.868	1.330	-
<b><i>Description:</i></b> System Engineering/Program Management			
<b><i>FY 2020 Plans:</i></b> Continued to fund System Engineering/Program management			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> For FY 2021, zero funding request submitted.			
<b><i>Title:</i></b> One System Remote Video Terminal (OSRVT)	1.467	3.060	-
<b><i>Description:</i></b> OSRVT			
<b><i>FY 2020 Plans:</i></b> Continued to fund interoperability and performance improvements for OSRVT.			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> For FY 2021, zero funding request submitted.			
<b>Accomplishments/Planned Programs Subtotals</b>	17.863	7.817	-

**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>
• A00018: RQ-7 UAV MODS	154.114	68.983	0.000	-	0.000	-	-	-	-	0.000	223.097

**Remarks**

**D. Acquisition Strategy**

A System Capability Demonstration (SCD) was conducted with four contractors. The results from the SCD in conjunction with proposal evaluations resulted in the competitive down select of a Best Value TUAS. A successful Milestone II Army Systems Acquisition Review Council (ASARC) was conducted 21 Dec 99 and a Milestone III Decision was reached on 25 Sep 02. The full rate production contract was awarded 27 Dec 02 and in FY 2009 the last of the authorized 104 systems was placed on contract. Continued development of the selected Tactical Unmanned Aircraft Vehicle (TUAV) system will be accomplished through a series of modifications and retrofits such as Shadow v2, Communications Relay, Laser Designator, Block III engine, and reliability upgrades. Development/ integration of these improved capabilities will be through individual efforts on a competitive technical services contract with Shadow contractors. Development of the Block III engine was

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

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
2040 / 7	PE 0305233A / RQ-7 UAV	RQ7 / RQ-7 Shadow UAV

accomplished through a competitive process. Management responsibilities of the TUAV RQ-7B variant EO/IR/LD payload was transferred from Program Executive Office (PEO) Aviation to PEO Intelligence, Electronic Warfare and Sensors (IEW&S) on 14 Feb 17. This was done in accordance with (IAW) ASA(ALT) memorandum titled: Transfer of Army Office of Primary Responsibility and Program Management Responsibility for RQ-7B Shadow EO/IR/LD. An Improved Payload for Shadow, competitively selected by PEO IEW&S - Product Manager Electro-Optic/Infrared (PdM EO/IR), will be integrated and qualified in FY 2019-2020.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305233A / RQ-7 UAV	<b>Project (Number/Name)</b> RQ7 / RQ-7 Shadow UAV
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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			
Base: Program Management	RO	PM UAS : Redstone Arsenal, AL	4.088	0.705		-		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			4.088	0.705		-		-		-		-	Continuing	Continuing	N/A

<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			
OIF Improvements / Block Upgrades / Capability Improvements	SS/CPFF	AAI Corporation : Hunt Valley, MD	4.605	1.869		-		-		-		-	0.000	6.474	-
System Engineering / Reliability Solutions	SS/CPFF	AAI Corporation : Hunt Valley, MD	2.025	6.116		-		-		-		-	Continuing	Continuing	-
Ground Equipment Improvements	C/CPFF	TBD: Competitive in FY18 : TBD: Competitive in FY18	22.231	-		-		-		-		-	Continuing	Continuing	Continuing
Block III Engine Development	C/CPFF	LSF : Redstone Arsenal, AL	30.725	-		-		-		-		-	0.000	30.725	-
Other Air Vehicle Improvements	C/CPFF	TBD: Competitive in FY18 : TBD: Competitive in FY18	17.018	0.246		-		-		-		-	Continuing	Continuing	Continuing
Assured, Positioning, Navigation, and Timing (APNT)	C/CPFF	TBD: Competitive in FY18 : TBD: Competitive in FY18	8.755	2.755		-		-		-		-	Continuing	Continuing	-
Payload Improvements	SS/CPFF	Various : Various	4.750	-		-		-		-		-	0.000	4.750	-
One System Remote Video Terminal (OSRVT)	SS/CPFF	AAI Corporation, MD : AAI Corporation, MD	16.525	1.467		3.060		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			106.634	12.453		3.060		-		-		-	Continuing	Continuing	N/A

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305233A / RQ-7 UAV	<b>Project (Number/Name)</b> RQ7 / RQ-7 Shadow UAV
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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			
Contractor Engineering Support	Various	Various : Various	3.212	0.262		0.685		-		-		-	Continuing	Continuing	Continuing
Base: Government Engineering and Logistic Support	MIPR	Various : Various	2.031	0.901		0.645		-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			5.243	1.163		1.330		-		-		-	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			
RQ-7 Developmental Testing of Product Development	Various	Various : Various	6.888	1.443		-		-		-		-	Continuing	Continuing	Continuing
RQ-7 Operational Testing of Product Developments	MIPR	Various : Various	0.600	2.099		3.427		-		-		-	Continuing	Continuing	Continuing
OSRVT Developmental Testing	MIPR	Various : Various	0.100	-		-		-		-		-	0.000	0.100	-
OSRVT - Operational Testing	MIPR	Various : Various	2.033	-		-		-		-		-	0.000	2.033	-
<b>Subtotal</b>			9.621	3.542		3.427		-		-		-	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>		125.586	17.863	7.817	-	-	Continuing	Continuing

**Remarks**

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305233A / RQ-7 UAV	<b>Project (Number/Name)</b> RQ7 / RQ-7 Shadow UAV
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Event Name	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
Assured Positioning, Navigation, and Timing (APNT)	[Redacted]				[Redacted]																							
APNT	[Redacted]				[Redacted]																							
OSRVT Increment II Interoperability Improvements	[Redacted]				[Redacted]																							
OSRVT	[Redacted]				[Redacted]																							
Improved Payload Integration	[Redacted]				[Redacted]																							
Payload Integration	[Redacted]				[Redacted]																							
Test and Evaluation	[Redacted]				[Redacted]																							
Test	[Redacted]				[Redacted]																							

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0305233A / RQ-7 UAV	<b>Project (Number/Name)</b> RQ7 / RQ-7 Shadow UAV
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Assured Positioning, Navigation, and Timing (APNT)	3	2016	4	2019
OSRVT Increment II Interoperability Improvements	1	2013	4	2020
Improved Payload Integration	2	2019	4	2020
Test and Evaluation	1	2020	4	2020



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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</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	-	6.524	4.214	0.000	-	0.000	2.259	0.000	0.000	0.000	0.000	12.997
BI7: <i>Biometrics Enabled Intelligence - MIP</i>	-	6.524	2.214	0.000	-	0.000	2.259	0.000	0.000	0.000	0.000	10.997
FL5: <i>Next Gen Biometric Collection Capability (MIP)</i>	-	0.000	2.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.000

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

The Next Generation Biometric Collection Capability (NXGBCC) is the replacement for the Biometrics Automated Toolset - Army (BAT-A) Program of Record (POR) which has been supporting overseas contingency operations for over 19 years, well beyond the standard 3 to 6 years of useful electronic equipment life. NXGBCC supports all three objectives of the National Defense to increase lethality, enhance International Cooperation, and improve business practices. NXGBCC initiates the data flow to the DoD Authoritative Biometrics Identification System (ABIS) and Military Intelligence systems. NXGBCC consists of an expeditionary biometric data management system called the Local Trusted Source (LTS), biometric static collection kits with palm and credential badge capability, and biometric mobile collection kits. NXGBCC will tactically collect, match, store, reference, and share biometric signatures and contextual data while providing data analysis capability at all echelons; enabling forces in competition, armed conflict, and re-competing in a Multi-Domain Operations (MDO) environment. NXGBCC processes Enemy Prisoners of War (EPWs), Displaced Persons, and Refugees. It also assists Operations in the Support in Consolidation Areas. NXGBCC enables commanders to protect their force, deny enemy movement, increase freedom of maneuver, protect civilian populations, manage detainees identities, and to defeat near-peer unconventional threats. FY 2020 funding for NXGBCC previously reflected in project BI7 was moved to project FL5.

Identity Intelligence Analytic Repository (I2AR) will serve as an analytical tool to produce, manage, and disseminate the DoD Biometrically Enabled Watchlist (BEWL) as well as extend opportunities for system and data integration with enhanced analytic data sharing across the Army and Intelligence Community (IC) partners. Analysts will use I2AR to conduct analysis and develop intelligence reports, in support of DoD and national community missions. I2AR will include the legacy Biometrics Identity Intelligence Resource (BI2R) functionality as well as elasticity, encryption, and open source software for enduring interoperability with DoD, IC, and external partners.

**Justification:**

Prior year funding for NXGBCC was previously included within project BI7. For FY 2020, NXGBCC funding is now reflected within project FL5. The \$2.000 million of FY 2020 Base Funding in FL5 will complete the prototype selection process via the Other Transaction Agreement (OTA) started in FY 2018. The program office will complete operational testing, interoperability testing, and New Equipment Training (NET) development.

The FY 2020 OCO of \$2.214 million in BI7 will continue to support the development of new software code & associated testing to deliver the Identity Intelligence Analytic Repository (I2AR) a replacement for the Biometrics Identity Intelligence Repository (BI2R) -the unique software-based analytic production system used by DoD's intelligence analysts to create products such as the Biometric Enabled Watchlist for Operation Freedom's Sentinel (OFS) and other worldwide missions) on cloud computing platforms.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</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	6.524	4.214	2.236	-	2.236
Current President's Budget	6.524	4.214	0.000	-	0.000
Total Adjustments	0.000	0.000	-2.236	-	-2.236
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-2.236	-	-2.236

**Change Summary Explanation**

No RDT&E Funds requested for FY 2021.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>				<b>Project (Number/Name)</b> B17 / <i>Biometrics Enabled Intelligence - MIP</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>
B17: <i>Biometrics Enabled Intelligence - MIP</i>	-	6.524	2.214	0.000	-	0.000	2.259	0.000	0.000	0.000	0.000	10.997
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Next Generation Biometric Collection Capability (NXGBCC) is the replacement for the Biometrics Automated Toolset - Army (BAT-A) Program of Record (POR) which has been supporting overseas contingency operations for over 19 years, well beyond the standard 3 to 6 years of useful electronic equipment life. NXGBCC supports all three objectives of the National Defense to increase lethality, enhance International Cooperation, and improve business practices. NXGBCC initiates the data flow to the DoD Authoritative Biometrics Identification System (ABIS) and Military Intelligence systems. NXGBCC consists of an expeditionary biometric data management system called the Local Trusted Source (LTS), biometric static collection kits with palm and credential badge capability, and biometric mobile collection kits. NXGBCC will tactically collect, match, store, reference, and share biometric signatures and contextual data while providing data analysis capability at all echelons; enabling forces in competition, armed conflict, and re-competing in a Multi-Domain Operations (MDO) environment. NXGBCC processes Enemy Prisoners of War (EPWs), Displaced Persons, and Refugees. It also assists Operations in the Support in Consolidation Areas. NXGBCC enables commanders to protect their force, deny enemy movement, increase freedom of maneuver, protect civilian populations, manage detainees identities, and to defeat near-peer unconventional threats. FY 2020 funding for NXGBCC previously reflected in project B17 was moved to project FL5.

Identity Intelligence Analytic Repository (I2AR) will serve as an analytical tool to produce, manage, and disseminate the DoD Biometrically Enabled Watchlist (BEWL) as well as extend opportunities for system and data integration with enhanced analytic data sharing across the Army and Intelligence Community (IC) partners. Analysts will use I2AR to conduct analysis and develop intelligence reports, in support of DoD and national community missions. I2AR will include the legacy Biometrics Identity Intelligence Resource (BI2R) functionality as well as elasticity, encryption, and open source software for enduring interoperability with DoD, IC, and external partners.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Army G2 Projects - B17	2.214	2.214	-
<b>Description:</b> Development of intelligence capabilities currently used to support Operation Freedom's Sentinel (OFS) and Operation Inherent Resolve (OIR) including Vigilant Pursuit Systems and the Biometrics Intelligence Information Repository (BI2R).			
<b>FY 2020 Plans:</b> Funds support I2AR.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 RDT&E funding elimination reflects dollars supporting other Army requirements.			
<b>Title:</b> Next Generation Biometrics Collection Capability (NXGBCC) transitions to FL5 in FY20	4.310	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>	<b>Project (Number/Name)</b> B17 / <i>Biometrics Enabled Intelligence - MIP</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Description:</b> The Next Generation Biometric Collection Capability (NXGBCC) system is the replacement for the Biometrics Automated Toolset ? Army (BAT-A) system Program of Record (POR) for tactical biometrics collection capability.			
<b>Accomplishments/Planned Programs Subtotals</b>	6.524	2.214	-

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

N/A

**Remarks**

**D. Acquisition Strategy**

The \$2.214 million of FY 2020 OCO funding in B17 will complete the development of new software code & associated testing necessary to deliver the Identity Intelligence Analytic Resource (I2AR). The acquisition strategy will be to exercise a contract option which enables for continuation of a contractor to develop activities for the Army Requirements Oversight Council (AROC) approved Quick Reaction Capability (QRC).

The NXGBCC acquisition strategy is to leverage the limited development of mature commercial technology to meet NXGBCC's collect, store, match, analyze, and share requirements and interface with the Biometric Family of Systems. The program office is using the Other Transaction Agreement (OTA) competitive prototyping process to down-select to the best biometric prototype solution. Upon OTA completion, NXGBCC will conduct the Initial Operational Test, procurement, fielding, and sustainment of NXGBCC.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>	<b>Project (Number/Name)</b> B17 / <i>Biometrics Enabled Intelligence - MIP</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			
PM Management Services	C/Various	TBD : TBD	12.921	-		-		-		-		-	0.000	12.921	-
<b>Subtotal</b>			12.921	-		-		-		-		-	0.000	12.921	N/A

<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			
Base Products Development	C/IDIQ	Various : TBD	55.034	2.214	Mar 2019	2.214		-		-		-	0.000	59.462	-
Product Development	TBD	ACC / Picatinny : New Jersey	2.537	4.310	Jan 2019	-		-		-		-	0.000	6.847	-
<b>Subtotal</b>			57.571	6.524		2.214		-		-		-	0.000	66.309	N/A

**Remarks**  
Contract will use an Other Transaction Agreement (OTA) for product selection.

<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			
PM Civilian Personnel and Other Support Costs	Various	Various : Various	20.102	-		-		-		-		-	0.000	20.102	-
<b>Subtotal</b>			20.102	-		-		-		-		-	0.000	20.102	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			
IA, T&E, Threat Assessment,	Various	Various : TBD	5.066	-		-		-		-		-	0.000	5.066	-

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>	<b>Project (Number/Name)</b> B17 / <i>Biometrics Enabled Intelligence - MIP</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			
Interoperability Certifications															
<b>Subtotal</b>			5.066	-		-		-		-		-	0.000	5.066	N/A
<b>Project Cost Totals</b>			95.660	6.524		2.214		-		-		-	0.000	104.398	N/A

**Remarks**  
 Prior years are mostly associated with the termination of the Joint Personnel Identification Version 2 (JPIv2) project.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>	<b>Project (Number/Name)</b> B17 / <i>Biometrics Enabled Intelligence - MIP</i>

Event Name	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>Army G2 Projects</b>																												
Product Development																												
	PD																											
FY18 Operational Test & Evaluation																												
	FY18 OT&E																											
FY20 Product Development																												
					FY20 PD																							
FY20 Systems Test & Evaluation																												
									FY20 ST&E																			
FY20 Operational Test & Evaluation																												
									FY20 OT&E																			
FY22 Product Development																												
													FY22 PD															
FY22 Systems Test & Development																												
													FY22 ST&E															
FY22 Operational Test & Evaluation																												
													FY22 OT&E															
FY24 Product Development																												
																					FY24 PD							
FY24 Systems Test & Development																												
																									FY24 ST&E			
FY24 Operational Test & Development																												
																									FY24 OT&E			
<b>Next Generation Biometric Collection Capability (NXGBCC)</b>																												

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>	<b>Project (Number/Name)</b> B17 / <i>Biometrics Enabled Intelligence - MIP</i>

Event Name	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>NXGBCC Program Planning</b>																												
AROC CDD Signed	█																											
CDD	█																											
Other Transaction Agreement - Phase 1	█																											
OTA - 1	█																											
Other Transaction Agreement - Phase 2	█																											
OTA - 2	█																											
Initial Operational Test				█																								
IOT				█																								
Milestone-C				▲																								
MS-C				▲																								
Procurement - OTA					█																							
OTA - Proc					█																							
New Equipment Training & Fielding					█				█				█				█				█				█			
NET					█				█				█				█				█				█			
Initial Operational Capability									▲																			
IOC									▲																			
Full Operational Capability																	▲											
FOC																	▲											



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>	<b>Project (Number/Name)</b> B17 / <i>Biometrics Enabled Intelligence - MIP</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Acquisition Decision Memorandum	4	2015	4	2015
Systems Requirements Review	2	2013	2	2013
Technical Assessment	3	2014	3	2014
Operational Assessment (Technical Report)	1	2015	1	2015
Contract Closeout	2	2015	2	2015
PM JPlv2 Closeout	2	2015	1	2016
Army G2 Projects	1	2017	1	2025
Product Development	1	2017	3	2019
Systems Test & Evaluation	2	2017	4	2017
Operational Test & Evaluation	4	2017	1	2018
FY18 Product Development	1	2018	3	2018
FY18 Operational Test & Evaluation	4	2018	2	2019
FY20 Product Development	1	2020	3	2020
FY20 Systems Test & Evaluation	3	2020	4	2021
FY20 Operational Test & Evaluation	4	2020	4	2021
FY22 Product Development	1	2022	3	2022
FY22 Systems Test & Development	3	2022	4	2023
FY22 Operational Test & Evaluation	4	2022	4	2024
FY24 Product Development	1	2024	3	2024
FY24 Systems Test & Development	3	2024	4	2025
FY24 Operational Test & Development	4	2024	4	2025
Next Generation Biometric Collection Capability (NXGBCC)	1	2018	1	2032

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>	<b>Project (Number/Name)</b> B17 / <i>Biometrics Enabled Intelligence - MIP</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
NXGBCC Program Planning	1	2018	4	2019
MDD	4	2016	4	2016
AoA Report	1	2018	3	2018
AROC CDD Signed	3	2018	4	2019
Other Transaction Agreement - Phase 1	4	2018	1	2019
Other Transaction Agreement - Phase 2	2	2019	3	2020
Initial Operational Test	4	2019	3	2020
Milestone-C	2	2020	2	2020
Procurement - OTA	3	2020	3	2021
New Equipment Training & Fielding	3	2020	2	2025
Initial Operational Capability	3	2021	3	2021
Full Operational Capability	3	2024	3	2024

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>				<b>Project (Number/Name)</b> FL5 / <i>Next Gen Biometric Collection Capability (MIP)</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>
FL5: <i>Next Gen Biometric Collection Capability (MIP)</i>	-	0.000	2.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Project FL5 was previously funded in Project B17.

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

The Next Generation Biometric Collection Capability (NXGBCC) is the replacement for the Biometrics Automated Toolset - Army (BAT-A) Program of Record (POR) which has been supporting overseas contingency operations for over 19 years, well beyond the standard 3 to 6 years of useful electronic equipment life. NXGBCC supports all three objectives of the National Defense to increase lethality, enhance International Cooperation, and improve business practices. NXGBCC initiates the data flow to the DoD Authoritative Biometrics Identification System (ABIS) and Military Intelligence systems. NXGBCC consists of an expeditionary biometric data management system called the Local Trusted Source (LTS), biometric static collection kits with palm and credential badge capability, and biometric mobile collection kits. NXGBCC will tactically collect, match, store, reference, and share biometric signatures and contextual data while providing data analysis capability at all echelons; enabling forces in competition, armed conflict, and re-competing in a Multi-Domain Operations (MDO) environment. NXGBCC processes Enemy Prisoners of War (EPWs), Displaced Persons, and Refugees. It also assists Operations in the Support in Consolidation Areas. NXGBCC enables commanders to protect their force, deny enemy movement, increase freedom of maneuver, protect civilian populations, manage detainees identities, and to defeat near-peer unconventional threats. FY 2020 funding for NXGBCC previously reflected in project B17 was moved to project FL5.

**Justification:**

Prior year funding for NXGBCC was previously included within project B17. For FY 2020, NXGBCC funding is now reflected within project FL5. The \$2.000 million of FY 2020 Base Funding in FL5 will complete the prototype selection process via the Other Transaction Agreement (OTA) started in FY 2018. The program office will complete operational testing, interoperability testing, and New Equipment Training (NET) development.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Next Generation Biometric Collection Capability	-	2.000	-
<b>Description:</b> NXGBCC is the replacement for BAT-A Program of Record (POR) for tactical biometrics collection capability.			
<b>FY 2020 Plans:</b>			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>	<b>Project (Number/Name)</b> FL5 / <i>Next Gen Biometric Collection Capability (MIP)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
The \$2.0 million of FY 2020 Base Funding completes the Other Transaction Agreement (OTA) process to down-select the prototypes from commercial vendors to the best system that meets Army requirements. Also, the program will begin NXGBCC testing and New Equipment Training development.  <b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> FY 2020 RDT&E Base funding reflects the final year the program will receive development dollars for the OTA, testing, and New Equipment Training (NET).			
<b>Accomplishments/Planned Programs Subtotals</b>	-	2.000	-

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

N/A

**Remarks**

N/A

**D. Acquisition Strategy**

The Next Generation Biometric Collection Capability (NXGBCC) acquisition strategy is to leverage the limited development of mature commercial technology to meet NXGBCC's collect, store, match, analyze, and share requirements and interface with the Biometric Family of Systems. The program office is using the Other Transaction Agreement (OTA) competitive prototyping process to down-select to the best biometric prototype solution. Upon OTA completion, NXGBCC will conduct the Initial Operational Test, procurement, fielding and sustainment of NXGBCC.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>	<b>Project (Number/Name)</b> FL5 / <i>Next Gen Biometric Collection Capability (MIP)</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			
Field Prototype Development	TBD	ACC / Picatinny : New Jersey	-	-		1.880		-		-		-	0.000	1.880	-
<b>Subtotal</b>			-	-		1.880		-		-		-	0.000	1.880	N/A

**Remarks**  
FY20 funding will complete the Other Transaction Agreement started in FY18.

<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			
New Equipment Development Training	TBD	DD SIT : Arizona	-	-		0.090	Feb 2020	-		-		-	0.000	0.090	-
<b>Subtotal</b>			-	-		0.090		-		-		-	0.000	0.090	N/A

**Remarks**  
The \$90K identified in FY20 will allow the Directorate of Doctrine and Intelligence Systems Training (DDIST) to begin NXGBCC new equipment training (NET) development. The tasks which DDIST will initiate includes providing doctrinal and regulatory training requirements, developing programs of instruction, and training data collection plans.

<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			
Operational and Interoperability Testing	TBD	TBD : TBD	-	-		0.030	Mar 2020	-		-		-	0.000	0.030	-
<b>Subtotal</b>			-	-		0.030		-		-		-	0.000	0.030	N/A

**Remarks**  
Initial Operational and Interoperability Testing will conclude in FY20.

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2021 Army								<b>Date:</b> February 2020			
<b>Appropriation/Budget Activity</b> 2040 / 7				<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>				<b>Project (Number/Name)</b> FL5 / <i>Next Gen Biometric Collection Capability (MIP)</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>	-	-	2.000		-	-	-	0.000	2.000	N/A	

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>	<b>Project (Number/Name)</b> FL5 / <i>Next Gen Biometric Collection Capability (MIP)</i>

Event Name	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>Next Generation Biometric Collection Capability (NXGBCC)</b>																												
<b>NXGBCC Program Planning</b>																												
AROC CDD Signed																												
CDD																												
Other Transaction Agreement - Phase 1																												
OTA -1																												
Other Transaction Agreement - Phase 2																												
OTA -2																												
Initial Operational Test																												
IOT																												
Milestone-C									1 ▲ MS-C																			
Procurement - OTA																												
Proc - OTA																												
New Equipment Training & Fielding																												
NET																												
Initial Operational Capability													2 ▲ IOC															
Full Operational Capability																					3 ▲ FOC							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0307665A / <i>Biometrics Enabled Intelligence</i>	<b>Project (Number/Name)</b> FL5 / <i>Next Gen Biometric Collection Capability (MIP)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Next Generation Biometric Collection Capability (NXGBCC)	1	2018	1	2032
NXGBCC Program Planning	1	2018	4	2019
AoA Report	1	2018	3	2018
AROC CDD Signed	3	2018	4	2019
Other Transaction Agreement - Phase 1	4	2018	1	2019
Other Transaction Agreement - Phase 2	2	2019	3	2020
Initial Operational Test	4	2019	3	2020
Milestone-C	2	2020	2	2020
Procurement - OTA	3	2020	3	2021
New Equipment Training & Fielding	2	2020	2	2025
Initial Operational Capability	3	2021	3	2021
Full Operational Capability	3	2024	3	2024



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

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	<b>R-1 Program Element (Number/Name)</b> PE 0708045A / End Item Industrial Preparedness Activities
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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	-	106.766	108.348	61.012	-	61.012	62.484	63.689	64.326	64.974	0.000	531.599
E25: Mfg Science & Tech	-	51.966	108.348	61.012	-	61.012	62.484	63.689	64.326	64.974	0.000	476.799
EA2: MANTECH INITIATIVES (CA)	-	54.800	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	54.800

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

This Program Element (PE) develops, demonstrates, and transitions manufacturing processes that enable improvements in producibility and affordability of emerging and enabling components and subsystems of Army ground and air platforms, Soldier systems, weapons systems, air & missile defense systems, and sensors and electronics. Initiatives within the PE result in cost savings and reduced risk of transitioning military-unique manufacturing processes into production. Project E25 fosters the transfer of new/improved manufacturing technologies to the industrial base, including manufacturing efforts that have potential for high payoff across the spectrum of Army systems.

The cited work is consistent with the Under Secretary of Defense, Research and Engineering science and technology focus areas and the Army Modernization Strategy.

Work in this PE is performed by the United States (U.S.) Army Futures Command; and the Army Space and Missile Defense Command/Army Forces Strategic Command (SMDC/ARSTRAT), Huntsville, AL.

<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	108.696	59.848	61.071	-	61.071
Current President's Budget	106.766	108.348	61.012	-	61.012
Total Adjustments	-1.930	48.500	-0.059	-	-0.059
• Congressional General Reductions	-	-	-	-	-
• Congressional Directed Reductions	-	-	-	-	-
• Congressional Rescissions	-	-	-	-	-
• Congressional Adds	-	48.500	-	-	-
• Congressional Directed Transfers	-	-	-	-	-
• Reprogrammings	-1.930	-	-	-	-
• SBIR/STTR Transfer	-	-	-	-	-
• Adjustments to Budget Years	-	-	-0.059	-	-0.059

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

**Project:** EA2: MANTECH INITIATIVES (CA)

FY 2019	FY 2020

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 0708045A / <i>End Item Industrial Preparedness Activities</i>
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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

- Congressional Add: *Additive Manufacturing Technology Insertion*
- Congressional Add: *Nanoscale Materials*
- Congressional Add: *Lightweight Transparent Armor*
- Congressional Add: *Engineering Data Synchronization*
- Congressional Add: *Power Take-Off Hybridization*
- Congressional Add: *FY 2018 NDAA SEC 825 MDAP Cost Overrun*

	FY 2019	FY 2020
	10.007	-
	19.935	-
	10.006	-
	9.807	-
	5.006	-
	0.039	-
Congressional Add Subtotals for Project: EA2	54.800	-
Congressional Add Totals for all Projects	54.800	-

**Change Summary Explanation**

FY20 increase due to congressional adds of \$48.500 Million

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0708045A / End Item Industrial Preparedness Activities				<b>Project (Number/Name)</b> E25 / Mfg Science & Tech			
<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>
E25: Mfg Science & Tech	-	51.966	108.348	61.012	-	61.012	62.484	63.689	64.326	64.974	0.000	476.799
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This Project develops and demonstrates manufacturing processes that enable improvements in producibility and affordability of emerging and enabling components and subsystems of Army ground and air platforms, Soldier systems, weapons systems, air & missile defense systems, and sensors and electronics. Focus is on components and subsystems such as advanced armor, lightweight structural components, sensors, propellants, and gun tubes. Additionally, work is performed to advance the state of the art in manufacturing processing and fabrication techniques for coatings, multifunctional materials, and structural elements for Army specific applications.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Long Range Precision Fires</p> <p><b>Description:</b> The effort funds manufacturing improvements to support areas such as Advanced Weapon Systems, Fire Control, and Advanced Energetics and Warheads. Work focuses on addressing challenges in areas such as enhanced missile seekers; fuses and initiators for munitions; and boring, honing, and rifling cannon and mortar barrels.</p> <p><b>FY 2020 Plans:</b> Demonstrate advanced materials, processing techniques, and tools to fabricate, bore, and rifle large caliber mortar and cannon tubes that enable long range fires; demonstrate more efficient propellant mixing and packing processes for rocket motors.</p> <p><b>FY 2021 Plans:</b> Will demonstrate reduced cost and time in manufacturing activities of advanced material, advanced processes, and new tooling to enable long range precision fires. Will decrease the use of multiple tools and eliminate long lead times on repairing and replacing items for Long Range Precision Fires.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding realigned to support higher priority Army modernization efforts within the project.</p>	9.716	6.054	2.962
<p><b>Title:</b> Next Generation Combat Vehicle</p> <p><b>Description:</b> This effort funds manufacturing technology advances needed for more affordable components and subsystems for tactical and combat vehicles and weapons systems. Work focuses on addressing challenges in areas such as advanced armor, lighter weight components, insensitive propellants, precision munitions, and vehicle power devices.</p>	19.375	25.029	22.180

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0708045A / End Item Industrial Preparedness Activities	<b>Project (Number/Name)</b> E25 / Mfg Science & Tech

<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> Mature processing of weight sensitive armor and protection systems that meet size, weight and power requirements; demonstrate manufacturing processes and non-destructive evaluation techniques to enable advanced welding for vehicle structures; develop manufacturing technologies that address unit cost and enable lower life cycle costs as compared to currently available modern combat powertrain components; develop manufacturing processes required to produce composite rubber track systems applicable to heavy ground combat systems.</p> <p><b>FY 2021 Plans:</b> Will use additive manufacturing advanced practices to reduce transition time and cost in replacement parts to increase in-theatre readiness. Will develop manufacturing processes to produce lighter weight armor protection and evaluate advanced welding practices.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding realigned to support higher priority Army modernization efforts within the project.</p>			
<p><b>Title:</b> Future Vertical Lift</p> <p><b>Description:</b> This effort funds manufacturing technology advances needed for more affordable manned and unmanned aircraft components and subsystems. Work focuses on addressing challenges in areas such as engine performance and life, reliable component integration/attachment, structural durability at low weight, sensors for aircraft protection and pilotage, and reduced corrosion.</p> <p><b>FY 2020 Plans:</b> Develop novel automated manufacturing methods for composite air platform components which are lighter weight and more maintainable; develop manufacturing of targeting sensors for airborne applications.</p> <p><b>FY 2021 Plans:</b> Will develop manufacturing processes to increase performance and increase process automation with more reliable materials; will develop novel approaches to reduce acquisition cost of materials, reduce component costs and reduce weight of overall components.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased to support the Army Future Vehicle Lift modernization priority.</p>	1.436	4.877	6.290
<p><b>Title:</b> Networks and Command, Control, Communications and Intelligence</p> <p><b>Description:</b> This effort funds manufacturing technology advances needed for more affordable components and subsystems for intelligence, surveillance, reconnaissance and targeting systems, mission command systems, electronic warfare and improved</p>	9.356	12.181	12.440

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	<b>Project (Number/Name)</b> E25 / <i>Mfg Science &amp; Tech</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
explosive device detect/defeat systems. Work focuses on addressing challenges in areas such as large format multi-color focal plane arrays, flexible displays, night vision sensors, target detectors, advanced antennas and sensors.				
<b>FY 2020 Plans:</b> Improve process maturation and material growth and yield of dual band digital imagers for aviation protection and pilotage; demonstrate optics coating deposition techniques for 3rd generation sensor platforms; develop Micro Electro Mechanical Systems (MEMS)-based navigation-grade inertial measurement units.				
<b>FY 2021 Plans:</b> Will improve manufacturing processes for digital sensors for aviation and pilotage; will demonstrate manufacturing of high dynamic range digital pixel images for aviation; develop manufacturing processes of dual band optical coatings.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding change reflects planned lifecycle of this effort.				
<b>Title:</b> Air & Missile Defense		1.436	3.553	8.000
<b>Description:</b> This effort funds manufacturing improvements to support areas such as High Energy Laser system components (e.g. diodes, optics), interceptor components, and armament systems for counter-unmanned aerial systems and counter-rocket, artillery, and mortar systems.				
<b>FY 2020 Plans:</b> Develop prototype tooling, test, and evaluation processes to improve manufacturing yield for high energy laser diodes; optimize manufacturing techniques for High Energy Laser (HEL) optics through manufacturing improvements to reduce lead time; develop improvements to the manufacturing process for electromagnetic mitigation devices to eliminate co-site, jamming, and other threats to radar and other communication systems; design and develop a manufacturing process for critical gyroscope components.				
<b>FY 2021 Plans:</b> Will develop high energy lasers that reduce manufacturing and supply chain costs and provide engagement capability against rockets, artillery, mortars and Unmanned Aerial Vehicles (UAVs); Will produce manufacturing processes that adapt to eliminate co-site, jamming and other electromagnetic spectrum threats; will optimize production processes to manufacture large precision optics.				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased to support the Army Air and Missile Defense modernization priority.				
<b>Title:</b> Soldier Lethality		6.550	5.138	9.140

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	<b>Project (Number/Name)</b> E25 / <i>Mfg Science &amp; Tech</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> This effort funds manufacturing technology advances needed for more affordable components and subsystems in areas such as aerial delivery of supplies, expeditionary basing, Soldier-borne sensors, clothing, and protective equipment. Work focuses on addressing challenges in areas such as multifunctional fabrics for shelters, uniforms and portage equipment; lightweight materials for body armor; and medical technologies such as biotechnology.</p> <p><b>FY 2020 Plans:</b> Develop manufacturing scale up for advanced metal organic materials to enable better integrated warfighter protection systems; advance manufacturing processes low light level imagers for night time situational awareness for Soldiers.</p> <p><b>FY 2021 Plans:</b> Will continue to develop manufacturing techniques for low next generation hand grenades and advance soldier protection with Chemical, Biological, Radiological, and Nuclear (CBRN) filters.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding increased to support the Army Soldier Lethality modernization priority.</p>				
<p><b>Title:</b> Cross-cutting</p> <p><b>Description:</b> This effort funds manufacturing technology advances with impact across processes or platforms of Army interest. Work focuses on addressing challenges in areas such as advanced additive manufacturing technologies for fabrication of weapons systems, platforms, and munitions; and novel manufacturing techniques for expedient and cost effective repair of worn or damaged platform components.</p> <p><b>FY 2020 Plans:</b> Demonstrate advanced machining solutions for large caliber weapons.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding realigned to support higher priority Army modernization efforts within the project.</p>		4.060	1.747	-
<p><b>Title:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun</p> <p><b>Description:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun</p>		0.037	-	-
<p><b>Title:</b> FY 2020 Congressional Add - Technical Textiles</p> <p><b>Description:</b> Program increase - technical textiles</p> <p><b>FY 2020 Plans:</b></p>		-	4.819	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0708045A / End Item Industrial Preparedness Activities	<b>Project (Number/Name)</b> E25 / Mfg Science & Tech		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
FY 2020 Congressional Add				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2020 congressional add funding to support technical textiles.				
<b>Title:</b> FY 2020 Congressional Add - Nanoscale Materials Manufacturing <b>Description:</b> Program increase - nanoscale materials manufacturing		-	12.318	-
<b>FY 2020 Plans:</b> FY 2020 Congressional Add				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2020 congressional add funding to support nanoscale materials manufacturing.				
<b>Title:</b> FY 2020 Congressional Add - Glass Separators for Lithium Batteries <b>Description:</b> Program increase - glass separators for lithium batteries		-	4.819	-
<b>FY 2020 Plans:</b> FY 2020 Congressional Add				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2020 congressional add funding to support glass separators for lithium batteries.				
<b>Title:</b> FY 2020 Congressional Add - Additive Manufacturing Technology Insertion <b>Description:</b> Program increase - additive manufacturing technology insertion		-	4.819	-
<b>FY 2020 Plans:</b> FY 2020 Congressional Add				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2020 congressional add funding to support additive manufacturing technology insertion.				
<b>Title:</b> FY 2020 Congressional Add - Power Take-off Hybridization <b>Description:</b> Program increase - Power take-off hybridization		-	6.819	-
<b>FY 2020 Plans:</b>				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0708045A / End Item Industrial Preparedness Activities	<b>Project (Number/Name)</b> E25 / Mfg Science & Tech		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
FY 2020 Congressional Add				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2020 congressional add funding to support power take-off hybridization.				
<b>Title:</b> FY 2020 Congressional Add - Tungsten Manufacturing Affordability Initiative for Armaments <b>Description:</b> Program increase - Tungsten manufacturing affordability initiative for armaments		-	4.819	-
<b>FY 2020 Plans:</b> FY 2020 Congressional Add				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2020 congressional add funding to support Tungsten manufacturing affordability initiative for armaments.				
<b>Title:</b> FY 2020 Congressional Add - Manufacturing Technology Program <b>Description:</b> Program increase - Manufacturing technology program		-	4.819	-
<b>FY 2020 Plans:</b> FY 2020 Congressional Add				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2020 congressional add funding to support the manufacturing technology program.				
<b>Title:</b> FY 2020 Congressional Add - Transparent Armor <b>Description:</b> Program increase - Transparent armor		-	3.819	-
<b>FY 2020 Plans:</b> FY 2020 Congressional Add				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2020 congressional add funding to support transparent armor.				
<b>Title:</b> FY 2020 SBIR/STTR Transfer <b>Description:</b> Funding transferred in accordance with Title 15 USC ?638		-	2.718	-
<b>FY 2020 Plans:</b>				



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	<b>Project (Number/Name)</b> E25 / <i>Mfg Science &amp; Tech</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Funding transferred in accordance with Title 15 USC ?638				
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>				
Funding transferred in accordance with Title 15 USC ?638				
<b>Accomplishments/Planned Programs Subtotals</b>		51.966	108.348	61.012
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
Not applicable for this item.				
<b>D. Acquisition Strategy</b>				
Not applicable for this item.				



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0708045A / End Item Industrial Preparedness Activities	<b>Project (Number/Name)</b> E25 / Mfg Science & Tech

Event Name	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	N/A																											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	<b>Project (Number/Name)</b> E25 / <i>Mfg Science &amp; Tech</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
N/A	1	2016	4	2019

**Note**

N/A

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0708045A / End Item Industrial Preparedness Activities					<b>Project (Number/Name)</b> EA2 / MANTECH INITIATIVES (CA)		
<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>
EA2: MANTECH INITIATIVES (CA)	-	54.800	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	54.800
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

This effort accelerates manufacturing technology for more affordable electronic warfare, communications and sensors systems components and subsystems to include radio frequency amplifiers, antennas, and focal plane arrays. This effort accelerates and supplements manufacturing technology for more affordable components and subsystems for tactical and combat vehicles and weapon systems. Work focuses benefit from working to develop and scale up the manufacturing process for nano-tungsten carbide powders and high-volume single-crystal tungsten rod manufacturing processes. This effort accelerates and supplements manufacturing technology for more advanced manufacturing and enterprise solutions. Work focuses on accelerating model based manufacturing to specific organic Army facilities and novel ways of applying additive manufacturing and monitoring material powder beds and process controls during additive manufacturing part build for weapon system components.

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

	<b>FY 2019</b>	<b>FY 2020</b>
<b>Congressional Add:</b> Additive Manufacturing Technology Insertion	10.007	-
<b>FY 2019 Accomplishments:</b> Additive Manufacturing Technology Insertion		
<b>Congressional Add:</b> Nanoscale Materials	19.935	-
<b>FY 2019 Accomplishments:</b> Nanoscale Materials		
<b>Congressional Add:</b> Lightweight Transparent Armor	10.006	-
<b>FY 2019 Accomplishments:</b> Lightweight Transparent Armor		
<b>Congressional Add:</b> Engineering Data Synchronization	9.807	-
<b>FY 2019 Accomplishments:</b> Engineering Data Synchronization		
<b>Congressional Add:</b> Power Take-Off Hybridization	5.006	-
<b>FY 2019 Accomplishments:</b> Power Take-Off Hybridization		
<b>Congressional Add:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun	0.039	-
<b>FY 2019 Accomplishments:</b> FY 2018 NDAA SEC 825 MDAP Cost Overrun		
<b>Congressional Adds Subtotals</b>	54.800	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0708045A / End Item Industrial Preparedness Activities	Project (Number/Name) EA2 / MANTECH INITIATIVES (CA)

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2021 Army</b>													<b>Date: February 2020</b>		
<b>Appropriation/Budget Activity</b>				<b>R-1 Program Element (Number/Name)</b>					<b>Project (Number/Name)</b>						
2040 / 7				PE 0708045A / End Item Industrial Preparedness Activities					EA2 / MANTECH INITIATIVES (CA)						
<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>
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	N/A : N/A	-	0.039		-		-		-		-	0.000	0.039	-
<b>Subtotal</b>			-	0.039		-		-		-		-	0.000	0.039	N/A
<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>
TBD	TBD	TBD : TBD	71.800	54.761		-		-		-		-	0.000	126.561	-
<b>Subtotal</b>			71.800	54.761		-		-		-		-	0.000	126.561	N/A
<b>Project Cost Totals</b>			71.800	54.800		0.000		-		-		-	0.000	126.600	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	<b>Project (Number/Name)</b> EA2 / <i>MANTECH INITIATIVES (CA)</i>

	FY 2012				FY 2013				FY 2014				FY 2015				FY 2016				FY 2017				FY 2018			
	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	[REDACTED]																											

	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 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	<b>Project (Number/Name)</b> EA2 / <i>MANTECH INITIATIVES (CA)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
N/A	1	2016	4	2016

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>					<b>R-1 Program Element (Number/Name)</b> PE 1203142A / <i>SATCOM Ground Environment (SPACE)</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	-	9.927	34.169	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	44.096
FE1: <i>Dscs-Dcs (Phase II)</i>	-	4.074	4.260	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.334
FE2: <i>MILSATCOM System Engineering</i>	-	4.226	4.357	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.583
FE4: <i>Enroute Mission Command</i>	-	1.627	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.627
FI8: <i>Protected Anti-JAM Tactical SATCOM</i>	-	0.000	25.552	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	25.552

**Note**

1203142A - SATCOM Ground Environment (SPACE) funding has been realigned to 0303142A SATCOM Ground Environment (SPACE) in FY 2021 and out.

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

The SATCOM Ground Environment (SPACE) funding line supports the Army's Network Modernization Strategy Line Of Effort (LOE) 1: Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

FE1: Defense Satellite Communications System (DSCS)/Digital Communications System (DCS) (Phase II):

This project develops Satellite Communication (SATCOM) ground subsystem equipment and software in support of Joint Chiefs of Staff (JCS) validated Mission Command Network and Systems (MCNS) requirements for the worldwide Defense Enterprise Wideband SATCOM System (DEWSS). DEWSS is composed of the Super High Frequency (SHF) Defense Satellite Communications System (DSCS) and Wideband Global SATCOM (WGS) programs, which are required to support legacy, interim and emerging communication space architectures and future Force requirements. Expansion of the WGS constellation and upgrades to both DSCS and WGS are vital to support the Army's emerging power projection and rapid deployment role. DSCS and WGS provide multiple channels of tactical end-to-end connectivity and interoperability with strategic networks and national decision-makers, satisfying JCS network operations.

FE2: Military Satellite Communications (MILSATCOM) System Engineering (SE):

Military Satellite Communications (MILSATCOM) System Engineering (SE) assures that tactical Army Satellite Communications (SATCOM) and SATCOM On-The-Move (SOTM) systems are engineered to legally and efficiently operate worldwide. MILSATCOM SE shapes Joint SATCOM systems' design efforts, standards development and planning processes. MILSATCOM SE represents the Army's tactical interests within DoD, Commercial & International forums to ensure affordable and scalable future SATCOM capabilities for maneuver forces. These efforts ensure that the Army continues to evaluate evolving technologies for the planning and designing of SATCOM solutions that reduce technical and programmatic impacts.

Program funding has been realigned to MILSATCOM System Engineering (0303142A/456) beginning in FY 2021.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / <i>SATCOM Ground Environment (SPACE)</i>	
<p>FE4 / Enroute Mission Command:            Mission Description and Budget Item Justification:            Enroute Mission Command (EMC) supports the Global Response Force (GRF) and other Army units with the requirement to conduct Airborne forced entry operations with the ability to conduct mission command, to include mission planning and rehearsal, while enroute on board US Air Force Air Mobility Command (AMC) aircraft. EMC provides a modernization to enroute communications to enable broadband reach-back data capability utilizing military or commercial networks with adequate bandwidth support required by Mission Command and Intelligence applications. EMC will provide commanders with the ability to obtain and share near real-time information regarding intelligence, situational awareness and command and control information while enroute to their objective. The ability to adjust plans and strategize utilizing the latest Intel data will give the GRF the information dominance needed to execute their mission once they arrive at their objective.</p> <p>Due to rephasing of FY 2017 OPA funding into FY 2018/2019, program was restructured in Dec 2015. MDA addressed schedule issues (Oct 2016) by authorizing to field a Ku FISA FOC (4QFY17) and complete a Modification Word Order (MWO), adding Ka FISA capability, post Ku FISA FOC.</p> <p>F18: Protected Anti-jam Tactical SATCOM (Protected SATCOM) will fill a critical protected communications gap for anti-jam SATCOM capability for mobile ground forces conducting expeditionary operations in electronically contested environments. It provides the ability for the tactical Army to be resilient in a contested environment and protect against potentially catastrophic loss of situational awareness and command and control during critical battle movement. It will offer the Tactical Army protection against interference that is either intentional or unintentional. The effort includes development of a critical Protected Tactical Waveform (PTW) modem which will be integrated into Army tactical SATCOM terminals to provide higher throughputs, protection (anti-jam) against Electronic Warfare (EW), and resiliency in a contested environment; development of a dual small form factor modem that can run the PTW and the current Network Centric Waveform (NCW) to Army Expeditionary Signal Battalions (ESBs) and eventually Army Corps, Division, and Brigade Combat Teams; and development, testing and certification of prototype Advanced Extremely High Frequency (AEHF) protected SATCOM terminals which will augment existing AEHF terminals. The PTW efforts are synchronized with the Air Force and DoD's plans for PTW on Wideband Global SATCOM (WGS) the Protected Tactical Satellite (PTS), and commercial SATCOM systems.</p> <p>In FY 2020, new start development of an Advanced Extremely High Frequency (AEHF) protected SATCOM terminal prototype will begin. The new terminal will augment the existing capability of the Secure, Mobile, Anti-Jam, Reliable, Tactical Terminal (SMART-T) AEHF terminal, with the intent to backfill decreasing SMART-T numbers post FY 2025. This ensures the Army's ability to meet increasing EW threat requirements. It will provide AEHF protected SATCOM capability in a modular, more transportable, vehicle agnostic form factor, providing greater flexibility on the battlefield. The terminal will be built with the intent to migrate from the AEHF constellation to the PTS constellation.</p> <p>Program funding has been realigned to MILSATCOM System Engineering (0303142A/456) beginning in FY 2021 to support Protected Anti-jam Tactical SATCOM development, engineering, test and evaluation.</p>		

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (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	12.105	34.169	18.702	-	18.702
Current President's Budget	9.927	34.169	0.000	-	0.000
Total Adjustments	-2.178	0.000	-18.702	-	-18.702
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.178	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-18.702	-	-18.702

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE1 / Dscs-Dcs (Phase II)
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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
FE1: Dscs-Dcs (Phase II)	-	4.074	4.260	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.334
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

**Note**

1203142A - SATCOM Ground Environment (SPACE) funding has been realigned to 0303142A / 253 SATCOM Ground Environment (SPACE) in FY 2021 and out.

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

Project FE1, Defense Satellite Communications System - Digital Communications System (DSCS-DCS) supports the Army's Network Modernization Strategy Line Of Effort (LOE) 1 - Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

This project develops Satellite Communication (SATCOM) ground subsystem equipment and software in support of Joint Chiefs of Staff (JCS) validated Mission Command Network and Systems requirements for the worldwide Defense Enterprise Wideband SATCOM System (DEWSS). DEWSS is composed of the Super High Frequency (SHF) Defense Satellite Communications System (DSCS) and Wideband Global SATCOM (WGS) programs, which are required to support legacy, interim and emerging communication space architectures and future force requirements. Expansion of the WGS constellation and upgrades to both DSCS and WGS are vital to support the Army's emerging power projection and rapid deployment role. DSCS and WGS provide multiple channels of tactical end-to-end connectivity and interoperability with strategic networks and national decision-makers, satisfying JCS network operations in support of the President, JCS, combatant commanders, military departments, Department of State and other government departments and agencies.

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

	FY 2019	FY 2020	FY 2021
<b>Title:</b> SATCOM Terminal Digital Intermediate Frequency (IF) Implementation Analysis	2.852	2.517	-
<b>Description:</b> SATCOM Terminal Digital Intermediate Frequency (IF) implementation analysis aimed at improving bandwidth efficiency of gateway terminals while providing an additional layer of resiliency through terminal redundancy. These analyses include various evaluations for digital terminal components to replace current, less efficient, analog components. These analyses also include assessment of terrestrial connectivity among SATCOM terminals to enable Continuity Of Operations (COOP) and failover scenarios required for resiliency.			
<b>FY 2020 Plans:</b> Demonstrate SATCOM Gateway resiliency through path diversity; use SATCOM terminals at different geographical locations to support any SATCOM mission.			
<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 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE1 / Dscs-Dcs (Phase II)

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
1203142A - SATCOM Ground Environment (SPACE) funding has been moved to PE 0303142A / project 253 SATCOM Ground Environment (SPACE) in FY 2021 and out.			
<p><b>Title:</b> Electromagnetic Interference Mitigation Analysis</p> <p><b>Description:</b> Assess multiple interference mitigation/cancellation technologies for effectiveness in improving reliability/resiliency of strategic and tactical communications. Mature technology to software/firmware that will improve protected SATCOM modem/terminal performance in a electro-magnetic interference contested environment. Technology will also improve terminal performance against adversary and friendly satellite link jamming resources.</p> <p><b>FY 2020 Plans:</b> Transition performance specifications to be implemented into next generation SATCOM modem. Mature and demonstrate gateway resiliency by using satellite links and terrestrial connectivity simultaneously to support SATCOM missions.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> 1203142A - SATCOM Ground Environment (SPACE) funding has been moved to PE 0303142A / project 253 SATCOM Ground Environment (SPACE) in FY 2021 and out.</p>	1.222	1.549	-
<p><b>Title:</b> FY 2020 SBIR/STTR Transfer</p> <p><b>Description:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638</p>	-	0.194	-
<b>Accomplishments/Planned Programs Subtotals</b>	4.074	4.260	-

<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>
• BB8500: Defense Enterprise Wideband Satcom Systems	96.633	98.399	101.498	-	101.498	110.890	105.871	101.438	97.156	Continuing	Continuing
<b>Remarks</b>											

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE1 / Dscs-Dcs (Phase II)

**D. Acquisition Strategy**

This finances Project Manager, Defense Communications and Army Transmission Systems (PM DCATS) netcentric systems engineering, modem risk mitigation, and risk management framework support. Funding provides for SATCOM terminal upgrades, enhancement of baseband throughput capabilities, technology insertion and upgrades which improves SATCOM gateway resiliency while allowing for full utilization of Wideband Global SATCOM (WGS) capabilities. Both the Wideband SATCOM Operational Management System (WSOMS) and the Enterprise Wideband SATCOM Terminal System (EWSTS) Capability Production Documents (CPDs) contain Netcentric-Ready Key Performance Parameters (NR-KPPs) as required by CJCSI 6212.01C. Netcentric efforts are required to facilitate the migration from the current trunk-based communications systems to Internet Protocol (IP) based systems and to engineer, test and integrate IP based capabilities into WSOMS and EWSTS systems. Studies, risk mitigation, system integration and advanced demonstrations for Netcentric baseband and policy based control will accommodate technology insertion, data sharing, remote operations, architecture efforts and use of commercial technology, thus ensuring the life of the Defense Enterprise Wideband Satellite System (DEWSS) terminal family beyond 2025 and reducing lifecycle costs and enterprise requirements on the WGS and Defense Satellite Communication System (DSCS) satellites in the future. Contracting approach for new technology is through the use of Broad Agency Announcements (BAA) and Other Transaction Authority (OTA) contracts.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE1 / Dscs-Dcs (Phase II)
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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			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.194		-		-		-	0.000	0.194	-
<b>Subtotal</b>			-	-		0.194		-		-		-	0.000	0.194	N/A

<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			
SATCOM Terminal Digital IF Implementation Analysis	MIPR	TBD : APG, MD	2.709	2.021	Jan 2019	1.770		-		-		-	Continuing	Continuing	Continuing
Electromagnetic Interference Mitigation Analysis	MIPR	TBD : APG, MD	2.167	1.035	Jan 2019	1.786		-		-		-	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	0.155		-		-		-		-	0.000	0.155	-
<b>Subtotal</b>			4.876	3.211		3.556		-		-		-	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			
In-house Support	Allot	PdM WESS : Ft. Belvoir, VA	1.121	0.532		0.006		-		-		-	Continuing	Continuing	Continuing
Contractor Support	C/CPPF	ACC, MD : APG, MD	0.533	0.331	Jan 2019	0.504	Jan 2020	-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			1.654	0.863		0.510		-		-		-	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>			6.530	4.074	4.260	-	-	-	Continuing	Continuing	N/A

**Remarks**



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>			<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE1 / Dscs-Dcs (Phase II)	

Event Name	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
SATCOM Terminal Digital IF Implementation Analysis																												
Electromagnetic Interference Mitigation Analysis																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE1 / Dscs-Dcs (Phase II)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SATCOM Terminal Digital IF Implementation Analysis	1	2019	4	2025
Electromagnetic Interference Mitigation Analysis	1	2019	4	2025

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)					<b>Project (Number/Name)</b> FE2 / MILSATCOM System Engineering		
<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>
FE2: MILSATCOM System Engineering	-	4.226	4.357	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.583
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Program funding was realigned to 0303142A - SATCOM Ground Environment (SPACE) / 456 - MILSATCOM System Engineering beginning in FY 2021.

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

This funding line supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network Cross-Functional Team capability set approach to achieve the network modernization strategy.

FE2: Military Satellite Communications (MILSATCOM) System Engineering (SE) assures that tactical Army Satellite Communications (SATCOM) and SATCOM On-The-Move (SOTM) systems are engineered to legally and efficiently operate worldwide. MILSATCOM SE shapes Joint SATCOM systems' design efforts, standards development and planning processes. MILSATCOM SE represents the Army's tactical interests within DoD, Commercial & International forums to ensure affordable and scalable future SATCOM capabilities for maneuver forces. These efforts ensure that the Army continues to evaluate evolving technologies for the planning and designing of SATCOM solutions that reduce technical and programmatic impacts.

FY 2019-2020 funds the systems engineering required to support technology maturation, systems analysis, and planning associated with joint SATCOM development efforts including complying with the implementation of the recommendations from the Protected SATCOM Communications Systems (PSCS) Analysis of Alternatives (AoA). This line continues to fund the systems architecture and analysis for current and future SATCOM efforts in both wideband and protected satellite communications. This effort includes collaborative work with the Air Force on the prototype Protected Tactical Service Field Demo (PTSFD) development and associated modem testing.

In addition, FY 2019-2020 funding covers the Narrowband Mobile User Objective System (MUOS) follow-on study efforts, Network Centric Waveform Tool (NCWT) Development and Testing and other efforts that have impact on tactical Army use of military and commercial satellite constellations. These efforts have a direct impact in reducing technical and programmatic risk for the acquisition efforts for tactical Army SATCOM systems using these constellations.

FY 2021 funding was realigned to 0303142A - SATCOM Ground Environment (SPACE) / 456 - MILSATCOM System Engineering.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Protected Communications System Engineering and WGS Communications	1.140	1.110	-
<b>Description:</b> Systems engineering support relating to the technology maturation, development and planning associated with joint SATCOM development efforts including Network Centric Waveform Tool (NCWT), Protected Tactical Service Field Demo			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE2 / MILSATCOM System Engineering		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p>(PTSFD) and the implementation of the recommendations from the Protected SATCOM Communications Systems (PSCS) Analysis of Alternatives (AoA).</p> <p><b>FY 2020 Plans:</b> Will continue systems engineering and analysis for the Protected Communications and WGS Communications as well as development and technology maturation on the NCW Tool.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease in FY 2021 realigned program funding from MILSATCOM System Engineering (1203142A/FE2) to MILSATCOM System Engineering (0303142A/456) beginning in FY 2021.</p>				
<p><b>Title:</b> Systems Architecture and Analysis Support</p> <p><b>Description:</b> Systems engineering support relating to the architecture and analysis of the Network Centric Waveform Tool (NCWT) and the collaborative SATCOM development Protected Tactical Service Field Demo (PTSFD) effort as well as other efforts, such as Analysis of Alternatives, that have impact on tactical Army use of military and commercial satellite constellations. These efforts have a direct impact in reducing technical and programmatic risk for the acquisition efforts for tactical Army SATCOM systems using the WGS and Protected constellations.</p> <p><b>FY 2020 Plans:</b> Will continue in house Engineering Support, Contractor Support and System Architecture &amp; Analysis.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease in FY 2021 realigned program funding from MILSATCOM System Engineering (1203142A/FE2) to MILSATCOM System Engineering (0303142A/456) beginning in FY 2021.</p>		2.544	2.557	-
<p><b>Title:</b> Testing and certification of critical SATCOM and Satellite-On-The-Move (SOTM) communication and network technologies</p> <p><b>Description:</b> Testing and certification of the prototype Protected Tactical Service Field Demo modem.</p> <p><b>FY 2020 Plans:</b> Will continue testing and certification of critical SATCOM and SOTM communication and network technologies.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease in FY 2021 realigned program funding from MILSATCOM System Engineering (1203142A/FE2) to MILSATCOM System Engineering (0303142A/456) beginning in FY 2021.</p>		0.542	0.492	-
<p><b>Title:</b> FY 2020 SBIR/STTR Transfer</p>		-	0.198	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE2 / MILSATCOM System Engineering

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Description:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>Accomplishments/Planned Programs Subtotals</b>	4.226	4.357	-

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

N/A

**Remarks**

FY 2017 and prior funding was aligned to 0303142A/456.

FY 2021 and future funding is realigned to 0303142A/456.

**D. Acquisition Strategy**

This project funds advanced systems engineering, research, development, test and evaluation of new and emerging technologies to optimize terminal performance and communications control. Once the technologies are mature and deemed feasible, funding and management responsibility for implementation of the technology will transition to PM Tactical Network and related programs of record.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE2 / MILSATCOM System Engineering
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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			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.198		-		-		-	0.000	0.198	-
<b>Subtotal</b>			-	-		0.198		-		-		-	0.000	0.198	N/A

<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 Communications and WGS Communications SE	TBD	Various : APG, MD	0.662	1.140	Feb 2019	1.148	Jan 2020	-		-		-	Continuing	Continuing	Continuing
<b>Subtotal</b>			0.662	1.140		1.148		-		-		-	Continuing	Continuing	N/A

**Remarks**  
FY 2019 funding was reduced by \$161K to support FY 2019 SBIR/STTR funds transfers.

<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			
Engineering (In House)	MIPR	PM WIN-T : APG, MD	0.679	1.169	Sep 2019	1.175	Sep 2020	-		-		-	Continuing	Continuing	-
Engineering Contractors Support	C/CPFF	PM WIN-T : APG, MD	0.671	1.155	Sep 2019	1.161	Mar 2020	-		-		-	Continuing	Continuing	-
System Architecture & Analysis	Various	CERDEC : APG, MD	0.128	0.220	Apr 2019	0.200	Apr 2020	-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			1.478	2.544		2.536		-		-		-	Continuing	Continuing	N/A

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE2 / MILSATCOM System Engineering
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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>			
Terminal Testing and Evaluation System Engineering	FFRDC	PEO C3T : TBD	0.112	0.192	Jan 2019	0.170	Dec 2019	-		-		-	0.000	0.474	-
Test Support	MIPR	Matrix : APG, MD	0.091	0.157	Apr 2019	0.134	Apr 2020	-		-		-	0.000	0.382	-
Testing, Certification	MIPR	TBD : APG, MD	0.112	0.193	Jul 2019	0.171	Jul 2020	-		-		-	0.000	0.476	-
<b>Subtotal</b>			0.315	0.542		0.475		-		-		-	0.000	1.332	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>
	2.455	4.226	4.357	-	-	-	Continuing	Continuing	N/A

**Remarks**  
 FY 2019 funding was reduced by \$161K to support FY 2019 SBIR/STTR funds transfers.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE2 / MILSATCOM System Engineering

Event Name	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
Protected Tactical Service Field Demo Modem Testing	[Redacted]				[Redacted]																							
	PTSFD Modem Testing																											
Narrowband (MUOS) Follow-on Studies					[Redacted]				[Redacted]																			
					Narrowband (MUOS) Follow-on Studies																							
Protected Tactical Service Field Demo	[Redacted]				[Redacted]																							
	PTSFD																											
NCW Tool Development and Testing	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
	NCW Tool Dev and Testing																											
SATCOM Systems Architecture & Analysis	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
	SATCOM Systems Architecture and Analysis																											



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE2 / MILSATCOM System Engineering

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Wideband AoA	4	2016	2	2018
Protected Tactical Service Field Demo Modem Testing	1	2018	4	2020
Narrowband (MUOS) Follow-on Studies	3	2019	4	2021
Protected Tactical Service Field Demo	4	2015	2	2021
NCW Tool Development and Testing	1	2015	4	2025
SATCOM Systems Architecture & Analysis	1	2018	4	2025

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE4 / Enroute Mission Command
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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
FE4: Enroute Mission Command	-	1.627	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.627
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

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

Enroute Mission Command (EMC) supports the Global Response Force (GRF) and other Army units with the requirement to conduct Airborne forced entry operations with the ability to conduct mission command, to include mission planning and rehearsal, while enroute on board US Air Force Air Mobility Command (AMC) aircraft. EMC provides a modernization to enroute communications to enable broadband reach-back data capability utilizing military or commercial networks with adequate bandwidth support required by Mission Command and Intelligence applications. EMC will provide commanders with the ability to obtain and share near real-time information regarding intelligence, situational awareness and command and control information while enroute to their objective. The ability to adjust plans and strategize utilizing the latest Intel data will give the GRF the information dominance needed to execute their mission once they arrive at their objective.

Ku FOC was achieved in September 2017 as directed by MDA due to rephasing of FY 2017 OPA funding into FY 2018/2019 and program was restructure in December 2015. A Modification Work Order (MWO), adding Ka Fixed Installed Satellite Antenna (FISA) capability began in FY 2018.

No FY 2020 or FY 2021 RDT&E funding.

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

	FY 2019	FY 2020	FY 2021
<b>Title:</b> Fuselage Mount Antenna (FMA) Training Cart	0.881	-	-
<b>Title:</b> EMI/EMC Testing	0.746	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	1.627	-	-

**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
• B00015: Enroute Mission Command (EMC)	37.401	8.609	0.000	-	0.000	-	-	-	-	0.000	46.010

**Remarks**

B08400: OPA funding line for EMC

**D. Acquisition Strategy**

The continued procurement of the EMC full operational capability follows DoDI 5000.02, Enclosure 12, 31 Aug 18 update (formerly DoDI 5000.02, 7 Jan 2015, Enclosure 13, Rapid Fielding of Capabilities). The Milestone Decision Authority (MDA) and project manager will tailor and streamline program strategy based on the required

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE4 / Enroute Mission Command
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timelines to meet urgent need capability requirements. The Army Executive Agent signed an Acquisition Decision Memorandum (ADM) on 27 April 2015 delegating MDA to PEO C3T. The MDA signed an ADM on 11 May 2015 selecting the KuKa Antenna and Radome for the Full Operational Capability (FOC). An ADM was signed on 20 May 2015 granting approval to enter into production and deployment phase.

Ku FOC was achieved in September 2017 as directed by MDA due to rephasing of FY 2017 OPA funding into FY 2018/2019 and program was restructured in Dec 2015. A Modification Work Order (MWO), adding Ka Fixed Installed Satellite Antenna (FISA) capability began in FY18.

Initial Operational Capability met in May 2015 with modification of five C-17s with satellite antennae and installation kits, and roll-on/roll-off, battalion level, Key Leader Node (KEN). FOC is 35 C-17s, eight Key Leader Enroute Node (KEN), and 24 company level Dependent Airborne Nodes (DAN), and a Command and Staff Palletized Airborne Node (CASPER).

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE4 / Enroute Mission Command
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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			
NRE for Baseband Redesign	MIPR	CERDEC CP&I : APG, MD	0.960	-		-		-		-		-	0.000	0.960	-
Fuselage Mount Antenna (FMA) Training Cart	C/FFP	Honeywell Aerospace Support Services : Norcross, GA	-	0.881	Mar 2019	-		-		-		-	0.000	0.881	-
<b>Subtotal</b>			0.960	0.881		-		-		-		-	0.000	1.841	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			
EMI/EMC Testing	MIPR	AMC : Wright-Patterson AFB, OH	-	0.746	Aug 2019	-		-		-		-	0.000	0.746	-
<b>Subtotal</b>			-	0.746		-		-		-		-	0.000	0.746	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>			0.960	1.627	0.000	-	-	-	0.000	2.587	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE4 / Enroute Mission Command

Event Name	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
Fuselage Mount Antenna (FMA) Training Cart																												
NRE for Baseband Redesign																												
EM/EMC Testing																												
Disposition Decision																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> FE4 / Enroute Mission Command

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MDA Decision	3	2015	3	2015
ONS IOC	3	2015	3	2015
EMI/EMC Test	4	2016	1	2017
Triband Radome Certification Flight Test	1	2017	2	2017
CASPAN Safe to Fly Test	4	2017	4	2017
Fuselage Mount Antenna (FMA) Training Cart	2	2019	4	2019
Ku Full Operational Capability (FOC)	4	2017	4	2017
NRE for Baseband Redesign	3	2018	1	2019
EMI/EMC Testing	4	2019	4	2019
Disposition Decision	1	2021	1	2021

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)				<b>Project (Number/Name)</b> F18 / Protected Anti-JAM Tactical SATCOM			
<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>
F18: Protected Anti-JAM Tactical SATCOM	-	0.000	25.552	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	25.552
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

Program funding was realigned to 0303142A - SATCOM Ground Environment (SPACE) / 456 MILSATCOM System Engineering beginning in FY 2021 to support Protected Anti-jam Tactical SATCOM development, engineering, test and evaluation.

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

This funding line supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network Cross-Functional Team capability set approach to achieve the network modernization strategy.

F18: Protected Anti-jam Tactical SATCOM (Protected SATCOM) will fill a critical protected communications gap for anti-jam SATCOM capability for mobile ground forces conducting expeditionary operations in electronically contested environments. It provides the ability for the tactical Army to be resilient in a contested environment and protect against potentially catastrophic loss of situational awareness and command and control during critical battle movement. It will offer the Tactical Army protection against interference that is either intentional or unintentional. The effort includes development of a critical Protected Tactical Waveform (PTW) modem which will be integrated into Army tactical SATCOM terminals to provide higher throughputs, protection (anti-jam) against Electronic Warfare (EW), and resiliency in a contested environment; development of a dual small form factor modem that can run the PTW and the current Network Centric Waveform (NCW) to Army Expeditionary Signal Battalions (ESBs) and eventually Army Corps, Division, and Brigade Combat Teams. The PTW efforts are synchronized with the Air Force and DoD's plans for PTW on Wideband Global SATCOM (WGS), the Protected Tactical Satellite (PTS), and commercial SATCOM systems.

FY 2020 funds will continue collaborative development, testing and certification with the US Air Force and Navy of a PTW modem and a Protected Tactical Satellite (PTS). The prototype of a protected modem and protected satellite were previously funded under the FE2 MILSATCOM Systems Engineering during the Protected Tactical Service Field Demo (PTSFD). The PTW modem and the accompanying satellite constellation continue the spiral development of critical protected communications capabilities. The funding on F18 Protected SATCOM incorporates the Army specific requirements to be included in these efforts.

FY 2020 funds will start efforts to test commercial Advanced Extremely High Frequency (AEHF) protected SATCOM terminal prototypes to meet recently identified critical capability gaps for anti-jam SATCOM. The new terminal will augment the existing capability of the Secure, Mobile, Anti-jam, Reliable, Tactical Terminal (SMART-T) AEHF terminal, with the intent to backfill decreasing SMART-T numbers due to obsolescence. This ensures the Army's ability to meet increasing EW threat requirements.

FY 2021 funding was realigned to 0303142A - SATCOM Ground Environment (SPACE) / 456 - MILSATCOM System Engineering to support Protected Anti-jam Tactical SATCOM development, engineering, test and evaluation.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> F18 / Protected Anti-JAM Tactical SATCOM		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> Protected Tactical Waveform Modem Development</p> <p><b>Description:</b> Development of Protected Tactical Waveform modem incorporating tactical Army specific requirements.</p> <p><b>FY 2020 Plans:</b> Development and engineering of Army specific requirements for the Protected Tactical Waveform Modem that will be utilized for protected communications.</p> <p>Activities are part of joint effort with the US Air Force and Navy.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease in FY 2021 realigns program funding from Protected Anti-jam Tactical SATCOM (1203142A/F18) to MILSATCOM System Engineering (0303142A/456) beginning in FY 2021 to support Protected Anti-jam Tactical SATCOM development, engineering, test and evaluation.</p>		-	10.613	-
<p><b>Title:</b> Protected Tactical Satellite Development</p> <p><b>Description:</b> Tactical Army requirement inserted during development of future Protected Tactical SATCOM satellite.</p> <p>Activities are part of joint effort with Air Force and Navy.</p> <p><b>FY 2020 Plans:</b> Research, development and engineering for the Protected Tactical Satellite incorporating Army specific requirements to be included on the satellite.</p> <p>Activities are part of joint effort led by the Air Force, to include Army and Navy.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease in FY 2021 realigns program funding from Protected Anti-jam Tactical SATCOM (1203142A/F18) to MILSATCOM System Engineering (0303142A/456) beginning in FY 2021 to support Protected Anti-jam Tactical SATCOM development, engineering, test and evaluation.</p>		-	3.565	-
<p><b>Title:</b> AEHF Protected SATCOM Terminal Prototype Development</p> <p><b>Description:</b> Research, development and testing of prototype AEHF Protected SATCOM terminals.</p> <p><b>FY 2020 Plans:</b></p>		-	10.213	-



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> F18 / Protected Anti-JAM Tactical SATCOM

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Initial research, development and testing of prototype AEHF Protected SATCOM terminals.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease in FY 2021 realigns program funding from Protected Anti-jam Tactical SATCOM (1203142A/F18) to MILSATCOM System Engineering (0303142A/456) beginning in FY 2021 to support Protected Anti-jam Tactical SATCOM development, engineering, test and evaluation.			
<b>Title:</b> FY 2020 SBIR/STTR Transfer <b>Description:</b> Funding transferred in accordance with Title 15 USC ?638	-	1.161	-
<b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638 <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638			
<b>Accomplishments/Planned Programs Subtotals</b>	-	25.552	-

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

N/A

**Remarks**

**D. Acquisition Strategy**

This project funds advanced systems engineering, research, development, test and evaluation of emerging protected Satellite Communications technologies to provide resilience and anti-jam protection against Electronic Warfare (EW). The program will leverage contracts established by the Air Force for the development of Protected Tactical Waveform (PTW) modems, including development of a dual small form factor modem capable of running the PTW and Network Centric Waveform - Resilient (NCW-R), beginning in FY2020. Production and Fielding of the PTW modems will begin in FY2023 under the Protected Anti-JAM Tactical SATCOM procurement line (B34002).

This project also funds the research, development and testing of an Advanced Extremely High Frequency (AEHF) protected SATCOM terminal prototype to aid in filling the identified critical gap in protected communications. This terminal is a direct follow-on effort to the Secure, Mobile, Anti-jam, Resilient, Tactical Terminal (SMART-T). The Program Office is working closely with the US Air Force on scheduling insertion of the terminal into the satellite Mission Planner as well as working with NSA to develop a timely path to certification. The terminal research and development effort will be awarded in FY2020; a development test combined with robust Military utility user assessment will inform an FY2022 decision point on the path forward to the terminal.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> F18 / Protected Anti-JAM Tactical SATCOM

Program funding was realigned to MILSATCOM System Engineering (0303142A/456) beginning in FY2021 to support Protected Anti-jam Tactical SATCOM development, engineering, test and evaluation.

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> F18 / Protected Anti-JAM Tactical SATCOM
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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			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.161		-		-		-	0.000	1.161	-
<b>Subtotal</b>			-	-		1.161		-		-		-	0.000	1.161	N/A

<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 Waveform Modem Development	TBD	To Be Determined : To Be Determined	-	-		10.613	Jan 2020	-		-		-	0.000	10.613	Continuing
Protected Tactical Satellite Development	TBD	To Be Determined : To Be Determined	-	-		3.565	Jan 2020	-		-		-	0.000	3.565	Continuing
AEHF Protected SATCOM Terminal Prototype Development	TBD	To Be Determined : To Be Determined	-	-		10.213	Apr 2020	-		-		-	0.000	10.213	Continuing
<b>Subtotal</b>			-	-		24.391		-		-		-	0.000	24.391	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>		-	-	25.552	-	-	-	0.000	25.552	N/A

**Remarks**  
 Program funding was realigned to 0303142A - SATCOM Ground Environment (SPACE) / 456 - MILSATCOM System Engineering to support Protected Anti-jam Tactical SATCOM development, engineering, test and evaluation beginning in FY2021.

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> F18 / Protected Anti-JAM Tactical SATCOM

Event Name	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
Protected Tactical Waveform (PTW) Development					PTW Modem Development																							
Protected Tactical Waveform (PTW) Modem Testing																	PTW Modem Testing											
Army Dual Waveform Development																					Army Dual Waveform Development							
Protected Tactical Satellite (PTS) Development									PTS Development																			
AEHF Protected SATCOM Terminal Prototype Development									AEHF Terminal Prototype Development																			
Decision Point: AEHF Protected SATCOM Terminal Production																	Decision Point: AEHF Terminal Production											

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1203142A / SATCOM Ground Environment (SPACE)	<b>Project (Number/Name)</b> F18 / Protected Anti-JAM Tactical SATCOM

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Protected Tactical Waveform (PTW) Development	2	2020	4	2022
Protected Tactical Waveform (PTW) Modem Testing	1	2023	4	2025
Army Dual Waveform Development	1	2024	4	2025
Protected Tactical Satellite (PTS) Development	2	2020	4	2025
AEHF Protected SATCOM Terminal Prototype Development	2	2020	4	2022
Decision Point: AEHF Protected SATCOM Terminal Production	4	2022	4	2022

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

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 1208053A / <i>Joint Tactical Ground 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	-	7.400	7.677	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.077
FE7: <i>Joint Tact Grd Station-P3I(MIP)</i>	-	7.400	7.677	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.077

**Note**

FY 2021 requested funding has been moved from PE 1208053A to PE 0208053A.

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

The Joint Tactical Ground Station (JTAGS) is a post-production, ACAT III program. JTAGS provides missile warning message data for the Air and Missile Defense (AMD) architecture and improves performance for Integrated Air and Missile Defense Fire Control Systems/Composite Army Air and Missile Defense Brigades. JTAGS disseminates near real time warning, alerting, and cueing information on ballistic missile launches and other tactical events of interest throughout the theater using existing communication networks, providing critical support to Combatant Commanders in their Areas of Responsibility (AOR). Four OCONUS deployed JTAGS units, which are deployed in three theaters (PACOM, CENTCOM, EUCOM), constitute DoD's only in-theater system providing space-based missile warning. The fifth CONUS system is used as an institutional trainer though is available as a deployable asset. JTAGS is designated as the in-theater element of the United States Strategic Command's Theater Event System (TES), supporting all Theater Missile Defense pillars, affording the shortest sensor to shooter connectivity. On 14 Jan 2016, the Army Acquisition Executive designated the JTAGS Pre-Planned Product Improvement (JTAGS P3I) program as a separate ACAT III modification program.

The JTAGS Program Element (PE) supports development and test to meet JTAGS Operational Requirement(s) Document (ORD) thresholds using improved sensors and algorithms as Pre-Planned Product Improvements (P3I). P3I Improvements upgrade JTAGS to a new Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, and improves warning tactical parameters and timeliness. JTAGS Block II is on contract for a two-Phase development effort. JTAGS Block II Phase 1 is complete. JTAGS Block II Phase 2 activities are broken into three spirals to expedite delivering critical capabilities sooner. Phase 2 Spiral 1 and Spiral 2 will be completed in FY 2020.

FY 2021 requested funding has been moved from PE 1208053A to PE 0208053A.

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 7: Operational Systems Development</i>	<b>R-1 Program Element (Number/Name)</b> PE 1208053A / <i>Joint Tactical Ground System</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	7.400	10.275	9.519	-	9.519
Current President's Budget	7.400	7.677	0.000	-	0.000
Total Adjustments	0.000	-2.598	-9.519	-	-9.519
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-2.598			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-9.519	-	-9.519

**Change Summary Explanation**

FY 2021 requested funding has been moved from PE 1208053A to PE 0208053A.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 1208053A / <i>Joint Tactical Ground System</i>				<b>Project (Number/Name)</b> FE7 / <i>Joint Tact Grd Station-P3I(MIP)</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>
FE7: <i>Joint Tact Grd Station-P3I(MIP)</i>	-	7.400	7.677	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.077
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

**Note**

FY 2021 requested funding has been moved from PE 1208053A to PE 0208053A / 635.

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

The Joint Tactical Ground Station (JTAGS) is a post-production, ACAT III program. JTAGS provides missile warning message data for the Air and Missile Defense (AMD) architecture and improves performance for Integrated Air and Missile Defense Fire Control Systems/Composite Army Air and Missile Defense Brigades. JTAGS disseminates near real time warning, alerting, and cueing information on ballistic missile launches and other tactical events of interest throughout the theater using existing communication networks, providing critical support to Combatant Commanders in their Areas of Responsibility (AOR). Four OCONUS deployed JTAGS units, which are deployed in three theaters (PACOM, CENTCOM, EUCOM), constitute DoD's only in-theater system providing space-based missile warning. The fifth CONUS system is used as an institutional trainer though is available as a deployable asset. JTAGS is designated as the in-theater element of the United States Strategic Command's Theater Event System (TES), supporting all Theater Missile Defense pillars, affording the shortest sensor to shooter connectivity. On 14 Jan 2016, the Army Acquisition Executive designated the JTAGS Pre-Planned Product Improvement (JTAGS P3I) program as a separate ACAT III modification program.

The JTAGS Program Element (PE) supports development and test to meet JTAGS Operational Requirement(s) Document (ORD) thresholds using improved sensors and algorithms as Pre-Planned Product Improvements (P3I). P3I Improvements upgrade JTAGS to a new Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, and improves warning tactical parameters and timeliness. JTAGS Block II is on contract for a two-Phase development effort. JTAGS Block II Phase 1 is complete. JTAGS Block II Phase 2 activities are broken into three spirals to expedite delivering critical capabilities sooner. Phase 2 Spiral 1 and Spiral 2 will be completed in FY 2020.

FY 2021 requested funding has been moved from PE 1208053A to PE 0208053A.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> JTAGS Test and Evaluation Support	1.083	0.504	-
<b>Description:</b> Test and evaluation support for the JTAGS P3I Block II program			
<b>FY 2020 Plans:</b>			



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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1208053A / <i>Joint Tactical Ground System</i>	<b>Project (Number/Name)</b> FE7 / <i>Joint Tact Grd Station-P3I(MIP)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Post Limited User Test (LUT) analysis and reporting. Supporting limited developmental testing for JTAGS Block II Phase 2 Spiral 3 tuning efforts.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> In FY 2021, funding has been moved from PE 1208053A to PE 0208053A.			
<b>Title:</b> JTAGS Block II Phase 2  <b>Description:</b> JTAGS Block II Phase 2 activities are broken into three spirals to expedite getting critical capabilities fielded sooner. Spiral 1 delivers stereo SBIRS Geosynchronous staring sensor capabilities and SBIRS HEO Pseudo-Link 4 (P/L 4) data. Spiral 2 delivers Cobra Brass and emerging threats data and Missile Defense System Exerciser (MDSE) capabilities (FY 2018-2020). Spiral 3 delivers software tuning and testing to the Operational Requirements Document (ORD) (FY2019-21). JROC-Memos 197-12 and 113-13 supports the need to develop and field JTAGS Block II capabilities as soon as possible.  <b>FY 2020 Plans:</b> Will continue limited development efforts of the JTAGS Block II Phase 2 Spiral 3 program which focuses on software tuning efforts to fully optimize sensor data, and evolving cyber hardening advances. Also covers some Government management/oversight.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> In FY 2021, funding has been moved from PE 1208053A to PE 0208053A.	6.317	7.173	-
<b>Accomplishments/Planned Programs Subtotals</b>	7.400	7.677	-

<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>
• BZ8420: <i>JOINT TACTICAL GROUND STATION MODS (JTAGS)</i>	5.434	-	0.000	-	0.000	-	6.387	-	-	0.000	11.821
• 0208053A: <i>Joint Tactical Ground System</i>	-	-	9.510	-	9.510	9.665	7.073	7.076	7.080	0.000	40.404

**Remarks**  
In FY 2021, funding has been moved from PE 1208053A to PE 0208053A to correctly align Major Force Program, National Security Space (MFP 12) resources.

**D. Acquisition Strategy**  
This program element develops critical software intensive improvements, while continuing to make maximum use of Non-Developmental Items (NDI)/Commercial Off-The-Shelf (COTS) components and Government Furnished Equipment (GFE). After design and integration, the system will be subject to thorough developmental and

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1208053A / <i>Joint Tactical Ground System</i>	<b>Project (Number/Name)</b> FE7 / <i>Joint Tact Grd Station-P3I(MIP)</i>

validation/verification testing to verify performance, operational effectiveness and suitability. P3I Improvements will upgrade JTAGS to a new Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, improving warning tactical parameters and timeliness. The acquisition of the JTAGS Block II effort is being performed under contract W9113M-12-C-0055, awarded 23 Aug 2012. The contract's development efforts are Cost Plus Incentive Fee (CPIF), and the contract's production is Firm Fixed Price (FFP).

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 7				PE 1208053A / Joint Tactical Ground System				FE7 / Joint Tact Grd Station-P3I(MIP)								
<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	
Government Program Management	Allot	Various : Redstone Arsenal AL	2.689	1.190	Oct 2018	1.161	Oct 2019	-		-		-	Continuing	Continuing	-	
<b>Subtotal</b>			2.689	1.190		1.161		-		-		-	Continuing	Continuing	N/A	
<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	
JTAGS P3I Block II Phase 2 Development	Option/ C/PIF	Northrop Grumman : Colorado Springs Co	4.590	3.749	Dec 2018	4.635	Dec 2019	-		-		-	Continuing	Continuing	-	
<b>Subtotal</b>			4.590	3.749		4.635		-		-		-	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	
Contractor Engineering Support	C/C/PPF	TBD : Huntsville AL	1.333	1.378	Apr 2019	1.377	Feb 2020	-		-		-	Continuing	Continuing	-	
<b>Subtotal</b>			1.333	1.378		1.377		-		-		-	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	
Test Support (ATEC/AIC/ JITC)	Various	Various : Various	1.616	1.083	Dec 2018	0.504	Dec 2019	-		-		-	Continuing	Continuing	-	
<b>Subtotal</b>			1.616	1.083		0.504		-		-		-	Continuing	Continuing	N/A	



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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1208053A / <i>Joint Tactical Ground System</i>	<b>Project (Number/Name)</b> FE7 / <i>Joint Tact Grd Station-P3I(MIP)</i>

Event Name	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
JTAGS P3I Block II Phase 2																												
JTAGS P3I Block II Phase 2 Spiral 1 (Starer, P/L4)																												
JTAGS P3I Block II Phase 2 Spiral 2 (Cobra Brass and Slow Wal																												
JTAGS P3I Block II Phase 2 Spiral 3 (limited tuning and testing to																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 1208053A / <i>Joint Tactical Ground System</i>	<b>Project (Number/Name)</b> FE7 / <i>Joint Tact Grd Station-P3I(MIP)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
JTAGS P3I Block II Phase 2	4	2015	4	2020
JTAGS P3I Block II Phase 2 Spiral 1 (Starer, P/L4)	4	2015	2	2020
JTAGS P3I Block II Phase 2 Spiral 2 (Cobra Brass and Slow Walkers)	4	2017	2	2020
JTAGS P3I Block II Phase 2 Spiral 3 (limited tuning and testing to ORD)	3	2018	4	2020

**Note**

JTAGS P3I program continues after FY20 under PE 0208053A