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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 II, Budget Activity 5

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Army • Budget Estimates FY 2021 • RDT&E Program

Table of Contents

Introduction and Explanation of Contents..... ii

Comptroller Exhibit R-1..... ix

Program Element Table of Contents (by Budget Activity then Line Item Number)..... xlix

Program Element Table of Contents (Alphabetically by Program Element Title)..... I

Exhibit R-2s..... 1

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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:

<i>Budget Activity</i>	<i>OSDPE / Project</i>	<i>Project Title</i>
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:

<u>Budget Activity</u>	<u>Old OSDPE / Project: Title</u>	<u>New OSDPE / Project</u>
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):

<u>Budget Activity</u>	<u>OSDPE / Project</u>	<u>Project Title</u>
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
 FY 2021 President's Budget
 Exhibit R-1 FY 2021 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

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

UNCLASSIFIED

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

	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
 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
	(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
 FY 2021 President's Budget
 Exhibit R-1 FY 2021 President's Budget
 Total Obligational Authority
 (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

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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	U
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

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

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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)	
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

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

UNCLASSIFIED

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 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 C
18	0602147A Long Range Precision Fires Technology	02	60,553				60,553	U
19	0602148A Future Verticle Lift Technology	02	96,484				96,484	U
20	0602150A Air and Missile Defense Technology	02	56,298				56,298	U
21	0602211A Aviation Technology	02						U
22	0602213A C3I Applied Cyber	02	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

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

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)	
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

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

UNCLASSIFIED

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 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 S e C
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

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

XX

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)
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

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
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

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)
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

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 Number	Item	Act	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)	See
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

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

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)
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

UNCLASSIFIED

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	Item	Act	FY 2021 Base	FY 2021 OCO for Base Requirements	FY 2021 OCO for Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)	See
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

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 (Base+Emerg+ OCO)	
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

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

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)	S e c
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

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

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)
114 0604785A	Integrated Base Defense (Budget Activity 4)	04		2,000		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

UNCLASSIFIED

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 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)	S
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

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

XXX

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)
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

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

UNCLASSIFIED

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 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
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 (CATT) 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

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

xxxii

UNCLASSIFIED

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+ e OCO)
145 0604822A	General Fund Enterprise Business System (GFEB)	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

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

UNCLASSIFIED

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
145	0604822A	General Fund Enterprise Business System (GFEBs)	05	21,201			21,201	21,201	U
146	0604823A	Firefinder	05	20,008			20,008	20,008	U
147	0604827A	Soldier Systems - Warrior Dem/Val	05	6,534			6,534	6,534	U
148	0604852A	Suite of Survivability Enhancement Systems - EMD	05	82,459			82,459	82,459	U
149	0604854A	Artillery Systems - EMD	05	11,611			11,611	11,611	U
150	0605013A	Information Technology Development	05	142,678			142,678	142,678	U
151	0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	115,286			115,286	115,286	U
152	0605028A	Armored Multi-Purpose Vehicle (AMPV)	05	96,594			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	16,264	U
155	0605031A	Joint Tactical Network (JTN)	05	31,696			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	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

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

xxxiv

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 Number	Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted S (Base+Emerg+ OCO)
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

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

XXXV

UNCLASSIFIED

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 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
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

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

xxxvi

UNCLASSIFIED

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)
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

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

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)	U C
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

UNCLASSIFIED

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 (Base+Emerg OCO)
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

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

xxxix

UNCLASSIFIED

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 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)	S e c
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

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

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)
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

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 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 C
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

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) C
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

R-1211PB: 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
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

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 (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	WMCCS/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

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

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)

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 (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 999999999	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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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 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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Army • Budget Estimates FY 2021 • RDT&E Program

Program Element Table of Contents (by Budget Activity then Line Item Number)

Appropriation 2040: Research, Development, Test & Evaluation, Army

Line #	Budget Activity	Program Element Number	Program Element Title	Page
136	05	0604780A	Combined Arms Tactical Trainer (CATT) Core.....	1
137	05	0604798A	Brigade Analysis, Integration and Evaluation.....	25
138	05	0604802A	Weapons and Munitions - Eng Dev.....	84
139	05	0604804A	Logistics and Engineer Equipment - Eng Dev.....	253
140	05	0604805A	Command, Control, Communications Systems - Eng Dev.....	358
141	05	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev.....	369
142	05	0604808A	Landmine Warfare/Barrier - Eng Dev.....	397
143	05	0604818A	Army Tactical Command & Control Hardware & Software.....	423
144	05	0604820A	Radar Development.....	533
145	05	0604822A	General Fund Enterprise Business System (GFEBS).....	542
146	05	0604823A	Firefinder.....	560

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Army • Budget Estimates FY 2021 • RDT&E Program

Program Element Table of Contents (Alphabetically by Program Element Title)

Program Element Title	Program Element Number	Line #	BA	Page
Army Tactical Command & Control Hardware & Software	0604818A	143	05.....	423
Brigade Analysis, Integration and Evaluation	0604798A	137	05.....	25
Combined Arms Tactical Trainer (CATT) Core	0604780A	136	05.....	1
Command, Control, Communications Systems - Eng Dev	0604805A	140	05.....	358
Firefinder	0604823A	146	05.....	560
General Fund Enterprise Business System (GFEBS)	0604822A	145	05.....	542
Landmine Warfare/Barrier - Eng Dev	0604808A	142	05.....	397
Logistics and Engineer Equipment - Eng Dev	0604804A	139	05.....	253
Medical Materiel/Medical Biological Defense Equipment - Eng Dev	0604807A	141	05.....	369
Radar Development	0604820A	144	05.....	533
Weapons and Munitions - Eng Dev	0604802A	138	05.....	84

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</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	-	20.514	9.241	3.568	-	3.568	2.753	0.000	0.000	0.000	Continuing	Continuing
<i>571: Close Cbt Tact Trainer</i>	-	0.664	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.664
<i>577: Gaming Technology In Support Of Army Training</i>	-	2.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.000
<i>582: Synthetic Envir Core</i>	-	9.109	9.241	3.568	-	3.568	2.753	0.000	0.000	0.000	Continuing	Continuing
<i>585: Aviation Combined Arms Tactical Trainer</i>	-	8.741	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.741

A. Mission Description and Budget Item Justification

The Combined Arms Tactical Trainers (CATT) represent a family of combined arms simulation systems designed to support the Army's simulation-based, Combined Arms Training Strategy. The CATT program portfolio directly supports the Army's Training Strategy and progressive training model by providing realistic training events and comprehensive After Action Reviews (AAR). CATT enables units, from crew to the battalion task force level, to conduct a wide variety of combat tasks on a realistic, interactive, synthetic battlefield. CATT's combination of manned simulators and staff officer workstations enables units to train as a combined arms team in a cost effective manner. The primary CATT system is the Close Combat Tactical Trainer (CCTT) which provides the underlying baseline architecture and AAR for CATT expansions, Pre-Planned Product Improvements (P3I) and system enhancements. The Reconfigurable Vehicle Simulator (RVS) supports combat convoy operations and Improvised Explosive Devices (IED) tasks. Synthetic Environment (SE) Core provides for the expansion of the synthetic environment baseline to include enhanced interoperability and the products and infrastructure to support current and future combat operations and mission rehearsal. The first synthetic environments expanded were in the Aviation Combined Arms Tactical Trainer (AVCATT) and the CCTT for both the Active and Reserve components. Gaming Technology provides an application to train and rehearse convoy-operations, platoon level, mounted infantry tactics, dismounted operations, rules-of-engagement training, cross-cultural communications training, IED defeat training, route clearance, ground-air coordination, Unmanned Aerial Vehicle (UAV) integration, and other small unit and individual training and mission rehearsal requirements. Soldiers can train in a common environment on geotypical or geospecific virtual terrain. It is also possible to link Gaming technology to actual communication, command, control, computer, and intelligence (C4I) systems and other CATT simulation systems to increase the utility and realism of the training. By practicing skills in CATT, units are able to effectively prepare for costly live fire and maneuver exercises, as well as training tasks deemed too hazardous to conduct in a live training environment. Fielded in both fixed site and mobile versions, CATT enables both Active and Reserve component units to prepare for real world contingency missions. By being able to use a wide array of training terrain databases and modify the behavior of the computer generated opposing forces, CATT offers an unlimited array of training options to support the Army's many regional combat missions. The combination of tough field and live fire training, and realistic simulation training in CATT, is the formula to prepare Soldiers and their Leaders for the uncertainties they face in combat operations.

FY 2021 base funding of \$3.568 million for SE Core will continue the development of the Standard Terrain Database Generation Capability (STDGC) to ensure that the process remains Army Geospatial Center (AGC) certified, in addition to, ensuring that the terrain data remains concurrent with supported training systems in fulfilling its synthetic terrain requirements.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	21.936	9.241	8.837	-	8.837
Current President's Budget	20.514	9.241	3.568	-	3.568
Total Adjustments	-1.422	0.000	-5.269	-	-5.269
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.422	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-5.269	-	-5.269

Change Summary Explanation

Decrease in FY 2021 budget was result of supporting of modernization efforts, funding from SE Core (Project 582) was decreased in order to increase funding for Synthetic Training Environment (STE) in PE 0604121A, Project FD6.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 571 / <i>Close Cbt Tact Trainer</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
571: <i>Close Cbt Tact Trainer</i>	-	0.664	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.664
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The research and development effort for Project 571 - Close Combat Tactical Trainer, has completed and the program will not request funding in FY 2021.

A. Mission Description and Budget Item Justification

The Close Combat Tactical Trainer (CCTT) immersively and comprehensively trains Armor, Cavalry, Infantry, Mechanized Infantry, and Armored Reconnaissance units from squad through Battalion/Squadron level, to include their staffs. The primary training audience operates from full-crew simulators, reconfigurable command posts, and live battalion command posts to accomplish their combined arms training tasks. CCTT is a ground based, collective training device comprised of the CCTT and the Reconfigurable Vehicle Tactical Trainer (RVTT). CCTT is comprised of full fidelity, manned simulators for the M1 Abrams main battle tank, M2 Bradley Fighting Vehicles (BFV) variants, and Cavalry Fighting Vehicles (CFV). RVTT is a CCTT Reconfigurable Vehicle Simulator (RVS) comprised of full fidelity, manned simulators for the High Mobility Multipurpose Wheeled Vehicle (HMMWV) and Heavy Expanded Mobility Tactical Truck (HEMTT).

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

	FY 2019	FY 2020	FY 2021
Title: Government Program Management for the Close Combat Tactical Trainer (CCTT) program.	0.169	-	-
Description: Government Program Management for the CCTT program.			
Title: Engineering and Manufacturing Development (EMD) phase contract activity for CCTT, and Interoperability between CCTT.	0.495	-	-
Description: Continue EMD phase contract activities for CCTT.			
Accomplishments/Planned Programs Subtotals	0.664	-	-

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>
• NA0170: <i>Close Combat Tactical Trainer</i>	33.080	-	0.000	-	0.000	-	-	-	-	0.000	33.080

Remarks

The RDT&E efforts are essential to provide enhancements for the hardware and software of the program to meet warfighter mission priorities and validated requirements. These enhancements, after proper testing, will be procured and fielded with the program's procurement funds.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 571 / <i>Close Cbt Tact Trainer</i>

D. Acquisition Strategy

All CCTT development utilizes small business competitively awarded contract vehicles and other Army programs for support of research and development.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 571 / <i>Close Cbt Tact Trainer</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
P3I in Support of Gaming Technology and Virtualization for Man																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 571 / <i>Close Cbt Tact Trainer</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
P3I in Support of Gaming Technology and Virtualization for Maneuver Training	2	2015	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>			Project (Number/Name) 577 / <i>Gaming Technology In Support Of Army Training</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
577: <i>Gaming Technology In Support Of Army Training</i>	-	2.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The research and development effort for Project 577 - Gaming Technology In Support Of Army Training, has completed and the program will not request funding in FY 2021.

A. Mission Description and Budget Item Justification

The Games for Training (GFT) Program prepares Soldiers and Leaders for executing Unified Land Operations by delivering robust training and mission rehearsal capabilities. The GFT program satisfies the Active, National Guard, and Army Reserves' educational requirements in the Operational, Institutional, and Self-Development Training Domains with a low-overhead, flexible, persistent training capability on geo-specific and geo-typical terrain that is relevant with all military platforms and weapon systems. This gaming capability allows units and commanders to train individual and collective tasks at the company and below level with minimal amount of resourcing required (land, ammunition, transportation, etc.) in support of Multi-Domain Operations (MDO) 2028. Through the use of GFT systems, commanders are able to refine and rehearse unit Tactics, Techniques, and Procedures (TTPs) and Standard Operating Procedures (SOPs) prior to executing live, large-scale training events. GFT trains higher echelon units and staffs by facilitating Tactical Exercises Without Troops (TEWT).

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

	FY 2019	FY 2020	FY 2021
Title: Engineering and Manufacturing Development (EMD) phase contract activity for the Games for Training (GFT) program.	2.000	-	-
Description: Continue EMD phase contract activities for the GFT program.			
Accomplishments/Planned Programs Subtotals	2.000	-	-

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
• NA0176: <i>Gaming Technology In Support of Army Training</i>	25.161	15.463	1.950	-	1.950	-	-	-	-	0.000	42.574

Remarks

OPA funding provides concurrency of the Virtual Battlespace 3 (VBS3) software that provides the Army enterprise use rights. Additionally, OPA funding conducts the procurement and fielding of the Stryker Virtual Collective Trainers (SVCT), new gaming hardware suites, and gaming system refreshes to meet Army Risk Management

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 577 / <i>Gaming Technology In Support Of Army Training</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>
Framework (RMF) requirements. The GFT program will also provide other commercial off the-shelf (COTS) and Government off the-shelf (GOTS) software applications used to train Active, Reserve, and Army National Guard soldiers in a PC based, shared environment.											

D. Acquisition Strategy

The acquisition strategy supports Army-wide gaming software for a commercial game based training system with government data rights, Virtual Battlespace 3 (VBS3), and associated Games for Training system cyber compliant hardware. The GFT RMF compliant hardware system consists of a common desktop or laptop computer, headset, and peripherals; this hardware is configured as gaming suites and is fielded to 88 various Army locations. In support of its fielding efforts, the GFT program acquires fielding support to provide logistical provisioning for the de-confliction and coordination with receiving locations as well as oversight for meeting network and cyber requirements. Additionally, program acquires technical support to provide system monitoring of the GFT hardware and software configuration to ensure compliance with Army's RMF requirements.

In FY 2018, the GFT Program was directed to complete divestment by the end of FY 2023, due to the requirement for training at the company echelon and below using gaming technologies being provided by the Synthetic Training Environment (STE) starting in FY 2021. In order to meet this desired end state, the program conducted the following contractual efforts in FY 2019: (1) Awarded a hardware procurement contract in 2nd quarter of FY 2019 through the ARMY Computer Hardware, Enterprise Software and Solution (CHESS) program for the planned GFT Classroom Suites and Technical Refreshes scheduled in FY 2019 and FY 2020. (2) Awarded an IT Services Contract in 2nd quarter of FY 2019 to provide network technical support, and to facilitate the program's cybersecurity strategy for its fielded systems through FY 2023. (3) Issued a Task Order award in 3rd quarter of FY 2019 to acquire fielding and logistics support for planned GFT Classroom Fieldings slated in FY 2019 and FY 2020. The aforementioned contractual efforts will support the program achieving Full Operational Capability (FOC) in FY 2020 (all 115 BOIP Cyber Compliant Classroom Suites will be installed). After FOC, the program will commence sustainment of all fielded GFT Systems through FY 2022, followed by a Divestment Period beginning in FY 2023 and completing by the end of the fiscal year.

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 577 / <i>Gaming Technology In Support Of Army Training</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
GFT Integration with LVC																												
GFT Data Center Migration Investigation																												
GFT Models Development & Integration																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 577 / <i>Gaming Technology In Support Of Army Training</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
GFT Program Management	1	2010	4	2018
GFT Integration with LVC	1	2010	4	2019
GFT Market Research	1	2017	4	2018
GFT Data Center Migration Investigation	3	2019	4	2019
GFT Models Development & Integration	3	2019	4	2019

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>				Project (Number/Name) 582 / <i>Synthetic Envir Core</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
582: <i>Synthetic Envir Core</i>	-	9.109	9.241	3.568	-	3.568	2.753	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports the Synthetic Environment Core (SE Core) Program. The SE Core Program is a foundational element and the only provider of correlated terrain for the Army's Live, Virtual, Constructive Integrated Training Environment (LVC ITE) that links Army training systems and simulators into an integrated and interoperable environment. SE Core's mission is to ensure that Army systems and simulators support U.S. Army Readiness by providing visual models (buildings and vehicles), terrain (over which the simulator moves), and entity behaviors (models performing realistic and appropriate actions such as movement and weapon effects) that are relevant and realistic in support of Multi-Domain Operations (MDO) 2028. As the exclusive provider of correlated terrain, SE Core ensures that all Army simulators/operators receive terrain that allows for a "Fair Fight" capability; that is, no one will have an inherent advantage over another because training did not occur on a "level playing field". Fair Fight allows air and ground forces to hold coordinated and integrated training events that accurately replicate combat operations for a train-as-we-fight capability.

A major component of the program is the SE Core-developed Standard Terrain Database Generation Capability (STDGC), the process used to build the terrain and models that the simulators and simulations employ. The Army Geospatial Center (AGC) gave SE Core its highest rating, the "Gold Standard", based on the quality of the STDGC process and the geospatial data generated by it. The program has been a certified, AGC co-producer of geospatial data since 2014. In addition to the correlated terrain databases and common visual models, SE Core components include Virtual One Semi-Automated Forces (Virtual OneSAF) (the computer generated force behaviors for virtual systems); the virtual systems architecture; and mission command development.

FY 2021 base funding of \$3.568 million for SE Core will continue the development of the STDGC to ensure that the process remains AGC certified, in addition to, ensuring that the terrain data remains concurrent with supported training systems in fulfilling its synthetic terrain requirements.

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

	FY 2019	FY 2020	FY 2021
Title: Engineering and Manufacturing Development (EMD) phase contract activity for the Synthetic Environment Core (SE Core) program.	8.580	8.618	3.209
Description: Continue EMD phase contract activities for the SE Core program.			
FY 2020 Plans: Continue to fulfill requirements of Increment 3. Will continue efforts to automate the terrain generation capability to meet the demand for synthetic terrain for constructive simulations. In addition funds are required to ensure the SE Core development environment remains compliant with Risk Management Framework mandates.			
FY 2021 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 582 / <i>Synthetic Envir Core</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Continues to fulfill requirements of Increment 3. Efforts will refine the terrain generation capability (STDGC) to ensure it remains concurrent in meeting the demand for synthetic terrain for constructive simulations. In addition, funds are required to ensure the SE Core development environment remains compliant with Risk Management Framework mandates. FY 2020 to FY 2021 Increase/Decrease Statement: Decrease from FY 2020 to FY 2021 is a result of reducing the developmental and integration efforts associated with establishing additional tools and process within the terrain generation capability.				
Title: Government Program Management for the Synthetic Environment Core (SE Core) program. Description: Government Program Management for the SE Core program. FY 2020 Plans: Will provide funding for program management travel supporting site surveys, in addition to funding the Subject Matter Experts providing technical input into the development of the SE Core terrain generation capability. FY 2021 Plans: Will provide funding for the Subject Matter Experts providing technical input into the development of the SE Core terrain generation capability. FY 2020 to FY 2021 Increase/Decrease Statement: Decrease from FY 2020 to FY 2021 is result of no longer conducting program management travel supporting site surveys.		0.529	0.204	0.359
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638		-	0.419	-
Accomplishments/Planned Programs Subtotals		9.109	9.241	3.568
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 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 582 / <i>Synthetic Envir Core</i>

D. Acquisition Strategy

The SE Core program is post Milestone B and will remain in the Engineering and Manufacturing Development phase for the remainder of its lifecycle. SE Core is a "software only" program that continuously develops terrain, virtual models and other software products for integration into existing training systems. It does not field products to the end user, therefore the program will not require a Milestone C decision or go into the Production phase. The SE Core program is developing the software tools and processes to develop the Army's common virtual environment to link simulation devices [to include: Close Combat Tactical Trainer (CCTT), Aviation Close Combat tactical Trainer (AVCATT) , Games for Training (GFT), Live, Virtual, Constructive Integrating Architecture (LVC-IA), Homestation Instrumentation Training System (HITS), Joint Land Component Constructive Training Capability (JLCCTC), Fires Simulation (FIRESIM), One Semi-Automated Forces (OneSAF)] into an interoperable environment and maintaining the synthetic terrain, models, and virtual OneSAF for the Army's Integrated Training Environment (ITE) concept.

The government awarded Increment 2 as a single award, cost plus fixed fee (CPFF), indefinite delivery indefinite quantity (IDIQ) contract to Leidos in August 2011 with a period of performance start date of December 2011. Leidos was formerly known as Science Applications International Corporation (SAIC). This contract has a one-year base with four one-year options. The government exercised the first option in December 2012, the second option in December 2013, the third option in December 2014 and the fourth option in December 2015. The government awarded a final delivery order in December 2016 that extended the period of performance of the Increment 2 contract into December 2017. The contract was extended an additional six months to June 2018 while the Increment 3 contract was competed.

In April 2018, in keeping with the original SE Core acquisition strategy of continuous development, the government awarded the Increment 3 contract as a single award, CPFF, IDIQ with a one year base and four one-year options and a target end date of FY 2023.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 582 / <i>Synthetic Envir Core</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	Various	Various : Various	3.622	-		-		-		-		-	0.000	3.622	3.622
Government Program Management Support	Various	PEO STRI : Orlando, FL	25.993	0.529	Oct 2018	0.204	Oct 2019	0.359	Feb 2021	-		0.359	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.419		-		-		-	0.000	0.419	-
Subtotal			29.615	0.529		0.623		0.359		-		0.359	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Technology Development - Architecture and Integration	C/CPFF	SAIC : Orlando, FL	6.946	-		-		-		-		-	0.000	6.946	6.946
Technology Development -Architecture and Integration	C/CPFF	SAIC : Orlando, FL	50.785	-		-		-		-		-	0.000	50.785	50.785
Technology Development -Database Virtual Environment Development	C/CPFF	CAE, USA : Orlando, FL	56.179	-		-		-		-		-	0.000	56.179	56.179
Technology Development-Common Virtual Environment & Management	C/Various	Leidos : Orlando, FL	80.284	-		-		-		-		-	0.000	80.284	80.284
Technology Development-Common Virtual Environment & Management INC III	C/Various	Leidos, Inc. : Orlando, FL	6.885	3.640	Oct 2018	-		-		-		-	0.000	10.525	Continuing
Technology Development-Common Virtual Environment & Management INC III	Option/ Various	Leidos : Orlando, FL	-	4.940	Mar 2019	8.618	Nov 2019	3.209	Nov 2020	-		3.209	Continuing	Continuing	Continuing
Subtotal			201.079	8.580		8.618		3.209		-		3.209	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 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 582 / <i>Synthetic Envir Core</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Remarks
FY 2020 award in Nov 2019 of \$8.827 million funds remaining option year 1 period and awards option year 2 period. FY 2021 award of \$3.209 million in Nov 2020 fully funds option year 2 period and awards option year 3 period.

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			
Technology Development - Test Support	Various	Test Community : Various	0.125	-		-		-		-		-	0.000	0.125	0.125
Subtotal			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		
		Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost					
Project Cost Totals		230.819		9.109		9.241		3.568		-		3.568	Continuing	Continuing	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 582 / <i>Synthetic Envir Core</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Increment 2 (Development and Integration)	4	2013	3	2018
Increment 3 (Development and Integration)	3	2018	3	2023

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 585 / <i>Aviation Combined Arms Tactical Trainer</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
585: <i>Aviation Combined Arms Tactical Trainer</i>	-	8.741	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.741
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The research and development effort for Project 571 - Aviation Combined Arms Tactical Trainer, has completed and the program will not request funding in FY 2021.

A. Mission Description and Budget Item Justification

The Aviation Combined Arms Tactical Trainer (AVCATT) is Army Aviation's only Collective Training Program of Record for Active, Reserve, and Army National Guard Aviation Units. AVCATT enables unit collective and combined arms air-ground training for AH-64, UH-60, CH-47, and UH-72 aircrews within the Live, Virtual and Constructive (LVC) Integrated Training Environment (ITE). The AVCATT also supports the training of Non-Rated crew members in crew coordination, flight, aerial gunnery, hoist, and slingload related tasks via the Non-Rated Crew Member Manned Module (NCM3); which can be linked to AVCATT's UH-60, CH-47, and UH-72 cockpit configurations to support a unit's specific Mission Training Requirements.

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

	FY 2019	FY 2020	FY 2021
Title: Government Program Management for the Aviation Combined Arms Tactical Trainer (AVCATT) program.	0.105	-	-
Description: Government Program Management for the AVCATT program.			
Title: Engineering and Manufacturing Development (EMD) phase contract activity for the Aviation Combined Arms Tactical Trainer (AVCATT) program.	8.636	-	-
Description: Continue EMD phase contract activities for the AVCATT program.			
Accomplishments/Planned Programs Subtotals	8.741	-	-

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>
• NA0173: <i>Aviation Combined Arms Tactical Trainer</i>	32.700	4.840	0.000	-	0.000	-	-	-	-	0.000	37.540

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / Combined Arms Tactical Trainer (CATT) Core	Project (Number/Name) 585 / Aviation Combined Arms Tactical Trainer

D. Acquisition Strategy

The government awarded a single award, cost plus fixed fee (CPFF), indefinite delivery indefinite quantity (IDIQ) contract to Applied Visual Technologies, a minority owned, small disadvantaged business, in December 2012. The period of performance of the base contract is through December 2017. Additional tasks are exercised through delivery orders which each have multiple options for development. The most recently awarded RDTE effort was on the fourth delivery order, awarded in September 2014, which included options for gunnery enhancements, integrated data modem development, training environment virtualization, aviation mission planning software development, maintenance tool kit development, manned unmanned teaming, and AH-64E concurrency development.

The government awarded a single award, CPFF, IDIQ services contract to Cole Engineering Services, Inc, a small business, in September 2015. The period of performance of the base contract is through September 2020. The third task order, awarded in June 2016, included hardware modernization development and Windows 10 research and testing.

AVCATT utilizes small business competitively awarded contract vehicles when able. Currently small businesses are conducting development for dynamic terrain enhancements, NCM3 development, and training effectiveness analysis.

The AVCATT program is post Milestone C. Although the system is in the production phase, continuous research, development, testing, and engineering is required in order to maintain concurrency with the real world aircraft and systems that the AVCATT simulates in the virtual training environment. The AVCATT program has fielded the full base order of issue of 23 suites but continues to release incremental hardware and software upgrades at approximate semiannual intervals. RDTE efforts will not continue in FY 2020, as system begins its transition into sustainment.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 585 / <i>Aviation Combined Arms Tactical Trainer</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AVCATT Program Management Support	Various	PEO STRI : Orlando, FL	3.648	0.105	Oct 2018	-		-		-		-	0.000	3.753	3.753
Subtotal			3.648	0.105		-		-		-		-	0.000	3.753	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AVCATT Interoperability	C/CPFF	Cole Engineering Services, INC : Orlando, FL	2.826	1.042	Jul 2019	-		-		-		-	0.000	3.868	3.868
AVCATT Image Generators	C/CPFF	Cole Engineering Services, INC : Orlando, FL	2.427	7.594	May 2019	-		-		-		-	0.000	10.021	10.021
AVCATT Virtualization - Manned Module	C/CPFF	Cole Engineering Services, INC : Orlando, FL	2.228	-		-		-		-		-	0.000	2.228	2.228
Subtotal			7.481	8.636		-		-		-		-	0.000	16.117	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
Project Cost Totals		11.129	8.741	0.000	-	-	0.000	19.870	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 585 / <i>Aviation Combined Arms Tactical Trainer</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
AVCATT/NCM3 EMD	████████████████				████████████████																							
AVCATT Interoperability	████████████																											
AVCATT Image Generator	████████████████																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i>	Project (Number/Name) 585 / <i>Aviation Combined Arms Tactical Trainer</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
AVCATT/NCM3 EMD	2	2017	2	2020
AVCATT Interoperability	2	2018	4	2019
AVCATT Image Generator	2	2018	2	2020

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	48.030	38.303	19.268	-	19.268	19.271	19.380	18.632	18.742	0.000	181.626
DY3: <i>NIE Test & Evaluation</i>	-	13.907	16.851	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.758
DY5: <i>Production/Field Coordination for Capability Sets</i>	-	2.351	2.157	1.045	-	1.045	0.975	0.897	1.147	1.146	0.000	9.718
DY7: <i>Army Systems Engineering, Architecture & Analysis</i>	-	12.980	13.476	18.223	-	18.223	18.296	18.483	17.485	17.596	0.000	116.539
DZ6: <i>Army Integration Management & Coordination</i>	-	18.792	5.819	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	24.611

Note
 Project FG7 Emerging Technology Initiatives was created in support of the Army Rapid Capabilities Office (RCO). This project was realigned to PE 0605054A (PROJECT FI3) Emerging Technologies Initiatives in FY 2019 for greater transparency of the Army RCO efforts.

System of Systems Engineering and Integration (SoSE&I) Directorate will be changing names to the Office of the Chief Systems Engineer in FY19.

Network Integration Exercise (NIE) activity will be referred to as Enduring Assessments starting in FY20 (to include events like the Joint Warfighter Assessments (JWAs)).

A. Mission Description and Budget Item Justification

This program element is comprised of five projects: Enduring Assessments (Joint Warfighter Assessment (JWA)); Production/Field Coordination for Capability Sets; Army Systems Engineering, Architecture & Analysis; Army Integration Management & Coordination; and Emerging Technology Initiatives. The specific evaluation requirements will support Mission Command Network (MCN) 2020, the Force 2025 objectives, and emerging technology insertion.

Project DY3: Enduring Assessments Test & Evaluation, synchronizes, integrates, and manages system and System of Systems (SoS) network capability evaluations in laboratory and operational environments in order to inform Army force modernization decisions that impact network improvements, interoperability compliance, operational readiness, and exploitable technology opportunities.

Project DY5: Production/Fielding Coordination for Capability Sets, provides for the development of a synchronized Brigade/Division level plan for the Production equipment delivery and Fielding (hand-off logistics and new equipment training) of Capability Set (CS) components (both hardware/software in A and/or B Kits) upon completion of Network Integration Evaluation (NIE), Army Interoperability Certification (AIC) and Army CS fielding decision.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>
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Project DY7: Army System Engineering, Architecture & Analysis, provides the Army's leadership and materiel developers with the necessary modernization planning, System of Systems (SoS) engineering, technical analysis, architectural products, critical path analysis, and risk analysis and mitigation planning to influence the Army's materiel portfolio. This project also explicitly funds Cyber Security engineering, architecture and development tasks necessary to create effective, affordable and secure network capabilities that address critical gaps, meet Mission Command Network (MCN) 2020 objectives and/or Force 2025 and Beyond (F2025B) initiatives. Integration of Army defensive/offensive cyber and Position, Navigation, and Timing (PNT) capabilities into the overall CS design, Multinational/Mission Partner Environments architecture development at both the tactical and enterprise levels, network modernization risks/gaps for Corps level units and below, and Army spectrum strategy.

Project DZ6: Army Integration Management & Coordination funds resources that support the technical and management (i.e. headquarters, resource management, acquisition, human resources, and operations) aspects of the Army Rapid Capabilities Office (RCO).

Project FG7: Emerging Technology Initiatives, will fund prototyping and demonstration of selected technology enabled capabilities to defeat emerging threats against ground, aviation, command, control, communications & reconnaissance systems and equipment, precision weapons, and Soldier equipment. Funding facilitates maturation and demonstration of emerging technologies and systems in relevant varied environments and tactical/operational scenarios. The focus is to mature technologies with a goal of initial production, limited fielding, and transition to a Program of Record in an Army or DoD Program Management Office.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	49.250	42.634	42.990	-	42.990
Current President's Budget	48.030	38.303	19.268	-	19.268
Total Adjustments	-1.220	-4.331	-23.722	-	-23.722
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-4.331			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.220	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-23.722	-	-23.722

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
DY3: <i>NIE Test & Evaluation</i>	-	13.907	16.851	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.758
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

During FY19, the Department of the Army instructed OCSE to manage and execute remaining unobligated DY3 funding at the direction of the Army Future Command's (AFC) Joint Modernization Command's (JMC) requirements related to the Joint Warfighter Assessment (JWA 19). Per JMC's direction, OCSE funded travel, equipment (hardware and software), and facilities costs related to the continued functioning of the Joint Warfighter assessment.

A. Mission Description and Budget Item Justification

Project DY3:

Enduring Assessments Test & Evaluation funding enables the Assistant Secretary of the Army (Acquisition Logistics and Technology) to support Army Futures Command concept and capability assessments with materiel system support and integration for Joint Warfighter Assessments (JWA). This effort synchronizes, integrates, and manages system and System of Systems (SoS) capability assessments in unit training exercise environments in order to inform Army force modernization decisions that impact system requirements, interoperability compliance, operational readiness, and exploitable technology opportunities aligned with Army modernization priorities and Army/Coalition interoperability.

Mission Engineering Assessments Directorate (MEAD), acting as lead agency for Assistant Secretary of the Army (Acquisition, Logistics and Technology) (ASA (ALT)), Office of Chief Systems Engineer (OCSE), leads and coordinates ASA (ALT)'s participation in Warfighter Assessment events to enable informal and formal evaluation of new material solutions and concepts within an integrated multi-domain and multi-national environment. With support from appropriate Program Offices, provides the design, engineering, systems integration, program management functions and expertise required to integrate networked and stand-alone systems into the event architecture; and conduct technical system of system architecture assessments.

Note:

During FY 2019, the Department of the Army instructed OCSE to manage and execute remaining unobligated DY3 funding at the direction of the Army Future Command's (AFC) Joint Modernization Command's (JMC) requirements related to the Joint Warfighter Assessment (JWA 19). Per JMC's direction, OCSE funded travel, equipment (hardware and software), and facilities costs related to the continued functioning of the Joint Warfighter assessment.

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

	FY 2019	FY 2020	FY 2021
Title: Integrated Evaluations	12.772	15.809	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>Description: These funds enable assessments of capabilities in laboratory and operational environments across the Army battlespace to assess the systems, SoS, and inform system development and fielding decisions. These funds support event planning, preparation, execution, and close-out.</p> <p>FY 2020 Plans: JWA 20; and initial planning for JWA 21: These funds provide for execution, close-out and assessment for JWA 20; and initial planning for JWA 21. Execution of JWA 20 is expected at Grafenwoehr, Germany with JWA 21 planning expected to occur at Ft Bliss, TX and to be determined location supporting Pacific area. As the Army Future Command matures, Mission Engineering and Assessment Directorate also expects to support planning, preparation, execution, close-out, and assessment of other exercises within the JMC portfolio.</p> <p>Planning: These funds support the development and implementation of horse blanket architecture; conducting design activities for integration of capability onto unit platforms; development, engineering, and documentation of network; and exercise planning and coordination, to include: developing a Validation Exercise (VALEX) plan that configures and checks out the system of systems prior to the exercise; assigning unit locations within the VALEX location; identifying and resolving security issues associated with running classified and/ or coalition network operations; validating all Information Assurance Accreditations for networked C4ISR systems and developing of technical mission threads used to validate the capabilities.</p> <p>These funds also support defining the network system configurations and routing schemes for each event.</p> <p>These funds support efforts to provide technical input on candidate systems at the Concepts and Capabilities Review Board and Strategic Planning Reviews for future events.</p> <p>Preparation: These funds support efforts leading up to the execution of the assessment exercise, to include lab based risk reduction (LBRR), platform integration design and build, safety release, and conducting of VALEX. The LBRR risk reduction efforts are conducted in controlled laboratory environments to identify and resolve integration, configuration and interoperability issues prior to assessments. Reports delivered by the LBRR document the results of network functional testing, routing, and thread testing.</p> <p>These funds provide for integration efforts such as design of installation kits on tactical platforms; fabrication of specialized cables, metal plates, racks, and brackets to enable platform installation/integration; and safety release testing. The scope of the integration effort also includes planning for Field Service Representatives (FSRs) and other technical support personnel, coordination and movement of the Fleet vehicles, and inventory management of systems.</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>

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

	FY 2019	FY 2020	FY 2021
<p>Following completion of platform integration efforts, these funds support a structured network VALEX consisting of four subordinate efforts; Load Exercise (LOADEX), ESTABLISH, INTEGRATE, and VALIDATE:</p> <ul style="list-style-type: none"> - LOADEX; Support unit installation of new network capabilities into existing network, to include setting Internet Protocol (IP) addresses and configure network systems changes; modify radio mission plans, system configuration files and system parameters; and perform test/fix/test processes at the system and component levels. - ESTABLISH; Verification of new hardware and software performance at the platform level. Troubleshoot issues associated with network system configurations and verify that each integrated platform can perform its mission while operating on the network. - INTEGRATE; Verification of networked related hardware/software performance and networked communications at each echelon. Troubleshoot issues found with new capabilities and ensure tactical unit information exchange will enable units to support their intended missions. - VALIDATE; Support unit conduct of mission threads to verify the correct routing of messages and information transfer among critical nodes in the network. <p>Execution: Funding supports all management and synchronization of field operations and support personnel during the events and coordination with the supported command. It also includes monitoring of network operations in the field, trouble ticket management, continued LBRR support to troubleshoot technical issues, deployment of mobile facilities, and replacement parts/ components required to effectively support concepts and capabilities under assessment.</p> <p>Closeout: These funds support all activities associated with the de-installation and recovery of systems, components, A-kits, cabling installed on platforms, and restoration of platforms to baseline configurations. Removal, inspection, repair/replacement, shipping, and storing of all materiel and infrastructure used to enable the unit to execute the event. Conduct AARs for process improvements.</p> <p>Assessment: These funds support activities associated with providing documentation and technical assessment of the system of systems architecture to include interfaces between systems, compare and contrast between architecture characteristics, and compliance with published network standards.</p> <p>In FY 2020 the Joint Warfighter Assessment (JWA), a key component of the Army's Force 2025 Maneuvers, will occur in Europe in support of US Army Europe and US European Command. The JWA is used to assess interim solutions to Army Warfighting Challenges. The JWA concept maximizes collective resources to advance joint and multinational interoperability, future force development, and unit training readiness priorities. Concepts and capabilities are embedded in a live, virtual, and constructive Multinational Division (MND) exercise that is representative of current and future operational environments. The JWA provides a unique opportunity to increase innovation, improve interoperability, and enhance unit readiness. JWA offers the triple pay-off</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>with future force development, training readiness, and Joint / Multinational interoperability assessment opportunities. These funds support the following major efforts associated with an assessment:</p> <ul style="list-style-type: none"> - Planning: Coordination with multiple stakeholders on the participation and resourcing of personnel, services, equipment and prototypes, and other deliverables needed for risk reduction events, capability and platform integration, training, field support and logistics, event battle rhythm/schedule, and developing network data products. - Preparation: Conduct risk reduction, complete system integrated designs and builds, build prototype vehicles for safety release, conduct system installation and checkout, validate the network, and obtain Information Assurance certifications. A key preparation task is the full scale live network validation event, which includes Cyber Vulnerability and Penetration Assessment of the network. This ensures the technical architecture and security procedures are place to support an exercise of this scale and complexity. Additionally, preparation efforts will supports new system user training. - Execution: Technical and logistics support during soldier-led assessments, trouble ticket management and closeout, and field support management. - Close-out: Inventorying platforms/systems, de-installing equipment, returning platforms to their original configurations. All unit equipment will be returned to original configuration following the exercise to ensure unit is fully prepared to execute wartime mission. The final close out task is conduct of After Action Review (AAR) and capture of lessons learned both for systems and architecture, as well as process and procedures for support exercises. <p>These funds may also be used for procuring limited equipment and materials (to include prototypes, when required), event infrastructure, field services, personnel support (government and contractor), and travel. These funds may also support similar activities for smaller assessment events leading up to the Joint Warfighter Assessment. Additionally, these funds will support initial planning for the Joint Warfighter 21, scheduled to support US Pacific Command and US Army Pacific. Planning events may occur at home station or require travel to support unit locations. Planning activities will include things such as concept and capability solicitation, initial architecture considerations, and logistics planning.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease in program funding due to JWA requirements being transferred to Army Futures Command starting in FY 2020.</p> <p>Remaining 12 OCSE Core FTEs on this project line will be re-aligned to OCSE?s DY7 project line in POM 22-26.</p>				
<p>Title: Infrastructure and other support</p> <p>Description: Title: Infrastructure and other support Description: Provides for setup, utilities, furniture, equipment and maintenance (of all equipment and facilities) used by OCSE core personnel.</p>		1.135	0.371	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p><i>FY 2020 Plans:</i> Overview: These funds provide packing, shipping, and setup for setup of operations at locations outside of Fort Bliss TX in support of JWA or other required exercises. It also provides for utilities, furniture, equipment and maintenance of equipment and facilities used by Mission Engineering and Assessment Directorate while at Fort Bliss in support of exercise planning, preparation, closeout, and events at Fort Bliss. It includes lease and support maintenance contracts for IT equipment/ support and facilities.</p> <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> FY 2020 to FY 2021 Increase/Decrease Statement: Decrease in program funding due to JWA requirements being transferred to Army Futures Command starting in FY 2020.</p> <p><i>Title:</i> FY 2020 SBIR/STTR Transfer</p> <p><i>Description:</i> Funding transferred in accordance with Title 15 USC ?638</p> <p><i>FY 2020 Plans:</i> Funding transferred in accordance with Title 15 USC ?638</p> <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC ?638</p>	-	0.671	-
Accomplishments/Planned Programs Subtotals	13.907	16.851	-

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>
• DY5: <i>Production/Field Coordination for Capability Sets</i>	2.351	2.157	1.045	-	1.045	0.975	0.897	1.147	1.146	Continuing	Continuing
• DY7: <i>Army Systems Engineering, Architecture & Analysis</i>	12.980	13.476	18.223	-	18.223	18.296	18.483	17.485	17.596	Continuing	Continuing
• DZ6: <i>Army Integration Management & Coordination</i>	18.792	5.819	0.000	-	0.000	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy
This project includes competitive contracts for test support services.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>

This project does not have any requirement for direct procurement of hardware or software.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army											Date: February 2020				
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>					Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>				

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Core Government Labor	Allot	SoSE&I : Various	4.056	4.578	Nov 2018	3.144	Nov 2019	-		-		-	Continuing	Continuing	-
Matrix Government Labor	MIPR	SoSE&I : Various	3.131	1.665	Nov 2018	1.186	Nov 2019	-		-		-	Continuing	Continuing	-
MITRE Labor	FFRDC	MITRE : Various	1.820	0.910	Nov 2018	0.621	Nov 2019	-		-		-	Continuing	Continuing	-
Contractor SETA Labor	C/CPFF	TBD : Various	4.020	2.467	Nov 2018	2.162	Nov 2019	-		-		-	Continuing	Continuing	-
Temporary Duty (TDY)	Allot	SoSE&I : Various	1.000	0.827	Nov 2018	0.578	Nov 2018	-		-		-	Continuing	Continuing	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.671		-		-		-	0.000	0.671	-
Subtotal			14.027	10.447		8.362		-		-		-	Continuing	Continuing	N/A

Remarks
 - Program Activities performed at Aberdeen Proving Grounds (MD), FT Bliss (TX), White Sands Missile Range (NM) and the selected NIE/JWA unit's home station.
 - Other NIE/JWA subject matter expertise support provided using existing Army contracts managed by PEO C3T, ATEC, and CERDEC.

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Integrated Evaluations	Various	Various : TBD	39.000	-		-		-		-		-	0.000	39.000	-
FY 2019 SBIR / STTR Transfer	TBD	Various : None	-	0.703		-		-		-		-	0.000	0.703	-
Subtotal			39.000	0.703		-		-		-		-	0.000	39.703	N/A

Remarks
 - Program Activities performed, Aberdeen Proving Grounds (MD), FT Bliss (TX), White Sands Missile Range (NM) and the selected NIE/JWA unit's home station.
 - Vehicle Integration performed under contract W56HZV-15-D-ER03 by BRTRC and other NIE/JWA support provided using existing Army contracts managed by PEO C3T, ATEC, and CERDEC.
 - Includes support services from DISA (for satellite time) and other governments agencies

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army											Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>					Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>			

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Vehicle Integration	C/CPFF	BRTRC : Various	7.825	-		4.584	Mar 2019	-		-		-	Continuing	Continuing	Continuing
Network Integration and Baseline Systems	MIPR	PEO C3T : Various	7.000	0.647	Mar 2019	2.058	Mar 2019	-		-		-	Continuing	Continuing	Continuing
Infrastructure and other support	TBD	TBD : Various	7.885	1.135	Mar 2019	0.645	Mar 2019	-		-		-	Continuing	Continuing	Continuing
Subtotal			22.710	1.782		7.287		-		-		-	Continuing	Continuing	N/A

Remarks
 - Program Activities performed at Aberdeen Proving Grounds (MD), FT Bliss (TX), White Sands Missile Range (NM) and the selected NIE/JWA unit's home station.
 - Vehicle Integration performed under contract W56HZV-15-D-ER03 by BRTRC.
 - Network Integration and Baseline Systems subject matter expertise support provided using existing Army contracts managed by PEO C3T and its subordinate Program Managers (PMs).

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			
ATEC Test and Evaluation Support	MIPR	ATEC : Various	21.617	0.700	Mar 2019	0.672	Mar 2019	-		-		-	Continuing	Continuing	Continuing
Lab Based Risk Reduction (LBRR)	MIPR	CERDEC : APG, MD	5.300	-		0.346	Mar 2019	-		-		-	Continuing	Continuing	Continuing
Satellite Region Hub Node (RHN) Technical Support	MIPR	Cyber Battle Lab : Ft. Gordon, GA	2.139	-		-		-		-		-	Continuing	Continuing	Continuing
Satellite Transponder Bandwidth	MIPR	DISA : Various	2.500	-		-		-		-		-	Continuing	Continuing	Continuing
Cyber Vulnerability/Risk Assessments	MIPR	Army Research Laboratory : Various	0.700	0.275	Mar 2019	0.184	Mar 2019	-		-		-	Continuing	Continuing	Continuing
Systems Under Evaluation (SUEs)	C/Various	TBD : Various	1.229	-		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			33.485	0.975		1.202		-		-		-	Continuing	Continuing	N/A

Remarks
 - Program Test support through ATEC, Lab Based Risk Reduction through CERDEC, and Cyber Vulnerability/Risk Assessments through Army Research Laboratory (ARL).

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</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
JWA 20 Planning - Execution																												
JWA 20 DP 2b					▲ 2																							
JWA 20 Lab Integration/Testing					■																							
JWA 20 Candidate Solution Integration					■																							
JWA 20 ValEx					■																							
JWA 20 Garrison CommEx					■																							
JWA 20 Field CommEx					■																							
JWA 20 Event					■																							
JWA 20 Event Analysis & Summary					■																							
JWA 21 Planning - Execution																												
JWA 21 DP 1	▲ 1																											
JWA 21 DP 2a					▲ 3																							
JWA 21 DP 2b									▲ 5																			

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</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
JWA 21 Lab Integration/Testing									████████																			
JWA 21 Candidate Solution Integration									██																			
JWA 21 ValEx									██																			
JWA 21 Garrison CommEx									█																			
JWA 21 Field CommEx									█																			
JWA 21 Event									██																			
JWA 21 Event Analysis & Summary																												
JWA 22 Planning - Execution									████████████████████																			
JWA 22 DP 1					▲4																							
JWA 22 DP 2a					▲6																							
JWA 22 DP 2b									▲7																			
JWA 22 Lab Integration/Testing													██████															
JWA 22 Candidate Solution Integration													██															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</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
JWA 22 ValEx													■															
JWA 22 Garrison CommEx													■															
JWA 22 Field CommEx													■															
JWA 22 Event													■															
JWA 22 Event Analysis & Summary													■															

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
JWA 20 Planning - Execution	3	2018	4	2020
JWA 20 DP 1	3	2018	3	2018
JWA 20 DP 2a	4	2018	4	2018
JWA 20 DP 2b	4	2019	4	2019
JWA 20 Lab Integration/Testing	1	2020	3	2020
JWA 20 Candidate Solution Integration	2	2020	2	2020
JWA 20 ValEx	2	2020	3	2020
JWA 20 Garrison CommEx	3	2020	3	2020
JWA 20 Field CommEx	3	2020	3	2020
JWA 20 Event	3	2020	3	2020
JWA 20 Event Analysis & Summary	3	2020	4	2020
JWA 21 Planning - Execution	2	2019	4	2021
JWA 21 DP 1	2	2019	2	2019
JWA 21 DP 2a	4	2019	4	2019
JWA 21 DP 2b	4	2020	4	2020
JWA 21 Lab Integration/Testing	1	2021	3	2021
JWA 21 Candidate Solution Integration	2	2021	2	2021
JWA 21 ValEx	2	2021	3	2021
JWA 21 Garrison CommEx	3	2021	3	2021
JWA 21 Field CommEx	3	2021	3	2021
JWA 21 Event	3	2021	3	2021
JWA 21 Event Analysis & Summary	3	2021	4	2021

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
JWA 22 Planning - Execution	2	2020	4	2022
JWA 22 DP 1	2	2020	2	2020
JWA 22 DP 2a	4	2020	4	2020
JWA 22 DP 2b	3	2021	3	2021
JWA 22 Lab Integration/Testing	1	2022	3	2022
JWA 22 Candidate Solution Integration	2	2022	2	2022
JWA 22 ValEx	2	2022	3	2022
JWA 22 Garrison CommEx	3	2022	3	2022
JWA 22 Field CommEx	3	2022	3	2022
JWA 22 Event	3	2022	3	2022
JWA 22 Event Analysis & Summary	3	2022	4	2022

Note

-With the loss of a dedicated unit (2/1 Armored Division) after AWA 17.1, NIE/JWA event planning and a unit requirements determination has to be made earlier than in previous FYs to allow Forces Command (FORSCOM) time to select the unit participating in the test events.
 -NIEs eliminated after NIE 18.2

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>					Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</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
DY5: <i>Production/Field Coordination for Capability Sets</i>	-	2.351	2.157	1.045	-	1.045	0.975	0.897	1.147	1.146	0.000	9.718
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides for the development of a synchronized Brigade/Division level plan for the Production equipment delivery and Fielding (hand-off logistics and new equipment training) of Capability Set (CS) components (both hardware/software in A and/or B Kits) upon completion of design, Type Classification and Material Release, Army Interoperability Certification (AIC) and Army CS fielding decision. It provides for the synchronized plan for production equipment delivery and fielding for the Integrated Tactical Network and the Security Force Advisory Brigades.

This project includes the following efforts: Synchronization and direct coordination between participating Program Executive Offices (PEOs), Program Managers (PMs), Research, Development and Engineering Commands (RDECOMs) and the Army's Brigade Combat Teams (BCT) throughout the CS Vehicle Integration and Synchronized Fielding process to ensure that a CS package is received, integrated, trained, and handed-off to the unit in a synchronized and efficient manner. Identification and assessment of available capabilities for inclusion into a CS, ITN and SFAB network modernization package. Alignment of the CS, ITN and SFAB requirement with the appropriate Programs of Record (PoR) and the recipient unit to define the unit's Network Basis of Issue (NBOI)/ Architecture by type of BCT. Coordination with PEOs, PMs, Army G-staff to ensure CS products are Materiel Released/Type Classified, fully resourced and synchronized by a single Integrated Master Schedule for design integration, testing, production, kitting, platform integration, training and fielding. Direct support during each of the unit's "New Equipment Training" and "New Equipment Fielding", along with the preparation for the BCT's rotation through one of the Army's Combat Training Centers, (Joint Readiness Training Center (JRTC) or National Training Center (NTC)). Ensuring that all training assets are reset and moved to the follow-on BCT. Manage all After Action activities.

This project does not fund the actual production, integration, nor fielding costs associated with the CS, ITN nor SFAB.

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

	FY 2019	FY 2020	FY 2021
Title: Production/Fielding Coordination for Capability Sets (CS)	2.351	2.138	1.045
<p>Description: This project provides for the development of a synchronized Brigade/Division level plan for the Production equipment delivery and Fielding (hand-off logistics and new equipment training) of Capability Set (CS) components (both hardware/software in A and/or B Kits) upon completion of design, Type Classification and Material Release, Army Interoperability Certification (AIC) and Army CS fielding decision. It provides for the synchronized plan for production equipment delivery and fielding for the Integrated Tactical Network and the Security Force Advisory Brigades.</p> <p>This project includes the following efforts: Synchronization and direct coordination between participating Program Executive Offices (PEOs), Program Managers (PMs), Research, Development and Engineering Commands (RDECOMs) and the Army's Brigade Combat Teams (BCT) throughout the CS Vehicle Integration and Synchronized Fielding process to ensure that a</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>CS package is received, integrated, trained, and handed-off to the unit in a synchronized and efficient manner. Identification and assessment of available capabilities for inclusion into a CS, ITN and SFAB network modernization package. Alignment of the CS, ITN and SFAB requirement with the appropriate Programs of Record (PoR) and the recipient unit to define the unit's Network Basis of Issue (NBOI)/ Architecture by type of BCT. Coordination with PEOs, PMs, Army G-staff to ensure CS products are Materiel Released/Type Classified, fully resourced and synchronized by a single Integrated Master Schedule for design integration, testing, production, kitting, platform integration, training and fielding. Direct support during each of the unit's "New Equipment Training" and "New Equipment Fielding", along with the preparation for the BCT's rotation through one of the Army's Combat Training Centers, (Joint Readiness Training Center (JRTC) or National Training Center (NTC)). Ensuring that all training assets are reset and moved to the follow-on BCT. Manage all After Action activities.</p> <p>This project does not fund the actual production, integration, nor fielding costs associated with the CS, ITN nor SFAB.</p> <p>FY 2020 Plans: These funds provide for the following:</p> <ul style="list-style-type: none"> - Production/Fielding Coordination for Network Modernization CS: Development, coordination, and execution management of the CS Fielding plan needed to produce, integrate, and field tested Brigade improvements to the BCTs. Synchronize the integration and coordinate CS Fielding including CS19 closeout, CS20 execution, and detail plan for CS21 along with high level planning for CS21/22. This effort funds government and contractor personnel and travel to unit location and fielding sites for planning and coordination of resources, integrated schedule, training and fielding across CS Programs of Record (PoR). It does not fund the production, physical integration, or fielding of the CS. - Production/Fielding Coordination for CS19 Products and Services: Complete training, integration and fielding of CS 19 units. Final close out of Materiel Fielding documentation and After Action Reports (AARs) for this includes synchronization, integration, and coordination of CS Fielding for the following CS19 Units (three (3) total): field network modernization (WIN-T Inc 2, Mission Command Systems) to three OCONUS IBCTs. Coordinate and execute the PM Mission Network (WIN-T Inc 2) TCN Lite fielding and the cascading/disposition of the TCN Heavy variants and multiple BCT NCR reduction efforts. Provide support to the fielding efforts for three (3) Security Force Assistance Brigades (SFABs). - Production/Fielding Coordination for CS20 Products and Services: Synchronize the integration of the CS package into the Brigade Combat Team (BCT) consisting of multiple network systems, on various configurations of Stryker, Mine Resistant Ambush Protected (MRAP) and High Mobility Multipurpose Wheeled Vehicle (HMMWV) platforms, at multiple locations. Complete synchronization, integration, and coordination of CS Fielding for the following CS20 Units (two (2) total): two (2) SBCT (OCONUS) and modernizing and conducting NCR reduction on one (1) SBCT. Synchronize the schedule for the execution of up to five Brigade Combat Team NCR SNE Reduction efforts and six Brigade 			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>

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

	FY 2019	FY 2020	FY 2021
<p>Combat Team TCN Lite fieldings and corresponding TCN Heavy cascade/disposition. Coordinate the integrated designs by platform, role, echelon, and BCT for CS20 including LTI. Finalize CS20 fielding requirements. Develop and manage the Integrated Master Schedule (IMS) for CS20. Coordinate A-Kit design, development and production and B-Kit's Integration Kit (IK) design, between system and platform Program Executive Offices (PEOs) and Program Managers (PMs) for CS20. Coordinate the delivery of prototype and production builds for CS20. Support Configuration Management (CM) of platform configuration implementations, designs, A-Kits, and B-Kits. Support fielding integration of Program of Record (PoR) assets in accordance with the defined BCT network architecture. Coordinate planning and execution of unit meetings, site inventories, A/B kit deliveries, chalk vehicle block schedules, assessment of Fully Mission Capable condition and integration of vehicle schedules (both component and complete vehicle installations). Coordinate and publish a synchronized New Equipment Training /New Equipment Fielding (NET/NEF) Integrated Master Schedule (IMS) for CS20 gaining units.</p> <p>- Production/Fielding Coordination for CS21 Products and Services: Conduct planning, synchronization and coordination of CS Fielding for the following CS21 Units (two (2) total): two (2) TAA IBCT with LTI. Coordinate for the execution of FY 2021 TCN Lite fielding and the cascading/disposition of the TCN Heavy variants. Execute a synchronized New Equipment Training /New Equipment Fielding (NET/NEF) Integrated Master Schedule (IMS) for fielding of CS21 to all gaining units. Begin CS21 NET/NEF requirements definition finalization and development of the NET/NEF integrated master schedule. This includes scheduling Program of Record unique NET, System of Systems NET (Capability Set holistic classes), and property accountability handoffs as an integrated process to enhance efficiency of the brigade modernization events.</p> <p>- Engineering and Integration coordination/planning efforts to develop and maintain CS unit-specific Network Basis of Issue (NBOI) architecture and Integrated Master Schedule (IMS): Developed and maintained unit-specific NBOI and IMS for the Army's Capability Set ? Synchronized Fielding (CSSF) efforts. Prepared ?as-built? NBOI and final IMS for units fielded during FY 2019, maintained unit-specific NBOI and IMS for units designated to undergo CS integration in FY 2020-2021, and developed initial (draft-level) NBOI and IMS for planned units in FY 2021 thru FY 2023. Organized, prepared, and conducted incremental technical reviews to examine and assess key/crucial planning activities and associated data product development supporting CS integration at specific fielded locations. Collected and analyzed sub-schedule performance against the baseline IMS to identify schedule risks for the Army's CS SF efforts. Validated that established incremental integration points were achievable and, if not, identified the risk to schedule. Analyzed schedule and cost performance against schedule established baselines, identified variances and their causes, and identified risks and/or impacts to critical path. Performed ?what if? schedule and cost analyses of alternative program courses of action to determine impact on schedule critical path and mission requirements. Updated and posted schedules on SharePoint for visibility and increased collaboration across the entire CS community to include ASA (ALT). Led or participated in other key technical reviews to include: After Action Reviews, Lessons Learned, Synchronized Fielding Technical Exchange Meetings (TEMs) and mini-TEMs.</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Provided reports and briefings to key CS stakeholders to support mutual programmatic goals and objectives and to help resolve issues and concerns affecting the CS community at-large. Identified key program risks as well as specific risk mitigation plans. Coordinated, prepared, and published a synchronized New Equipment Training / New Equipment Fielding (NET/NEF) Integrated Master Schedule (IMS) for CS fielding to all gaining units.</p> <p>FY 2021 Plans: Conduct initial planning for Fielding and Integration Coordination CS21, FY 2021 ITN Support and FY 2021 SFAB Vehicle Integration/CS21 Event Fielding Support: Synchronize and coordinate the execution of CS fieldings for the following CS 20 Units: Two (2) SBCTs with CS equipment. This effort includes conducting Synchronization Conference, NMIBs, IPRs and developing a consolidating schedule of all NET/ NEF and Integration events for the supported BCTs.</p> <p>Synchronize and coordinate the execution of integration of automotive upgrades, mission command and tactical radios into tactical vehicles for one (1) Security Force Advisory Brigades during FY21. This effort includes developing a consolidated integration schedule, inventorying tactical vehicles, developing integration trackers, conducting IPRs through the execution of the integration, providing on-site management and providing integration status and feedback from the integration sites.</p> <p>Synchronize and coordinate the execution of four (4) Integrated Tactical Network (ITN) Experimental IBCT during FY 2021. This effort includes developing a consolidated integration schedule, inventorying tactical vehicles, developing integration trackers, conducting IPRs through the execution of the integration, providing on-site status and feedback and managing operations at the integration site.</p> <p>Conduct planning and scheduling of CS Fielding for the following CS22 Units: two (2) SBCTs with CS equipment. Conduct Synchronization Conference, NMIBs and IPRs for each SBCT leading up to the execution of the CS NET/NEF effort. Develop a synchronized New Equipment Training /New Equipment Fielding (NET/NEF) Integrated Master Schedule (IMS) for fielding of CS22 to all gaining units. Begin CS22 NET/NEF requirements definition finalization and development of the NET/NEF integrated master schedule.</p> <p>Conduct planning and scheduling of automotive upgrades, mission command and tactical radios into tactical vehicles for full MTOE FY 2022 Security Force Advisory Brigades. This effort includes planning and developing an initial consolidated integration schedule, conducting Synchronization Conference and follow-on IPRs.</p> <p>Conduct planning and scheduling of automotive upgrades, mission command and tactical radios into tactical vehicles for of five (5) Integrated Tactical Network (ITN) Experimental IBCTs. This effort includes developing a consolidated integration schedule, conducting IPRs through the execution of the integration, providing on-site status and feedback and managing operations at the integration site.</p>				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>This includes scheduling Program of Record unique NET, System of Systems NET (Capability Set holistic classes), and property accountability handoffs as an integrated process to enhance efficiency of the brigade modernization events.</p> <p>Engineering and Integration coordination/planning efforts to develop and maintain CS unit-specific Network Basis of Issue (NBOI) architecture and Integrated Master Schedule (IMS):</p> <p>Develop and maintain unit-specific NBOI and IMS for the FY 2021 Capability Set, SFAB and ITN units. Post integration, update the unit-specific NBOI to an "as-built" NBOI. This effort includes four (4) ITN and one (1) SFAB units. Update the final IMS for units fielded during FY 2020, maintained unit-specific NBOI and IMS for units designated to undergo CS integration in FY 2021, and develop initial (draft-level) NBOI and IMS for planned units in FY 2022 thru FY 2023. There are currently five (5) ITN BCTs planned for FY 2022. Organize, prepare, and conduct incremental technical reviews to examine and assess key/crucial planning activities and associated data product development supporting CS, ITN and SFAB integration at specific fielded locations.</p> <p>Collect and analyzed sub-schedule performance against the baseline IMS to identify schedule risks for the CS, ITN and SFAB integration efforts. Validate that established incremental integration points were achievable and, if not, identified the risk to schedule. Analyze schedule and cost performance against schedule established baselines, identify variances and their causes, and identify risks and/or impacts to critical path. Perform "what if" schedule and cost analyses of alternative program courses of action to determine impact on schedule critical path and mission requirements. Update and poste schedules on SharePoint for visibility and increased collaboration across the CS, LTI and SFAB communities. Lead or participate in other key technical reviews to include: After Action Reviews, Lessons Learned, Network Modernization and Fielding Synchronization Meetings (formerly known as Synchronized Fielding Technical Exchange Meetings (TEMs) and mini-TEMs). Provide reports and briefings to key stakeholders to support mutual programmatic goals and objectives and to help resolve issues and concerns affecting the affected communities. Identify key program risks as well as specific risk mitigation plans. Coordinate, prepare, and publish a synchronized New Equipment Training / New Equipment Fielding (NET/NEF) Integrated Master Schedule (IMS) for CS, ITN and SFAB units.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease in program funding due to reduction to 4 core FTEs (funded by OCSE through FY 2021, FTE?s will be aligned to PEO C3T in POM 22-26.</p>				
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans:</p>		-	0.019	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Funding transferred in accordance with Title 15 USC ?638			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i>			
Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	2.351	2.157	1.045

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>	
• DY3: <i>NIE Test & Evaluation</i>	13.907	16.851	0.000	-	0.000	-	-	-	-	-	Continuing	Continuing
• DY7: <i>Army Systems Engineering, Architecture & Analysis</i>	12.980	13.476	18.223	-	18.223	18.296	18.483	17.485	17.596	-	Continuing	Continuing
• DZ6: <i>Army Integration Management & Coordination</i>	18.792	5.819	0.000	-	0.000	-	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

This project does not have any requirement for direct procurement of hardware or software.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.019		-		-		-	0.000	0.019	-
Subtotal			-	-		0.019		-		-		-	0.000	0.019	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Production/Fielding Coordination for Capability Sets	TBD	Various Note: 1 : TBD	18.474	2.351	Nov 2018	2.138	Nov 2019	1.045	Nov 2019	-		1.045	Continuing	Continuing	Continuing
Subtotal			18.474	2.351		2.138		1.045		-		1.045	Continuing	Continuing	N/A

Remarks
 Note: 1
 - Program Activities performed at TACOM (Warren MI) and CS units location receiving fielding.
 - Program Integration support through various PMs, PEOs, RDECOM.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Facilities and IT Support	TBD	Various Note:1 : TBD	0.694	-		-		-		-		-	0.000	0.694	-
Subtotal			0.694	-		-		-		-		-	0.000	0.694	N/A

Remarks
 Note: 1
 - Program Activities performed at TACOM (Warren MI) and CS units location receiving fielding.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		19.168	2.351	2.157	1.045	-	1.045	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 / 5			R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>			Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>				
	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</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
FY20 Synchronized Fielding																												
FY20 Build & Integration																												
FY20 NEW Equipment Training (NET)																												
FY20 NEW Equipment Fielding (NEF)																												
FY21 Synchronized Fielding																												
FY21 Architecture Design																												
FY21 Build & Integration																												
FY21 NEW Equipment Training (NET)																												
FY21 NEW Equipment Fielding (NEF)																												
FY22 Synchronized Fielding																												
FY22 Architecture Design																												
FY22 Build & Integration																												
FY22 NEW Equipment Training (NET)																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</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
FY22 NEW Equipment Fielding (NEF)																												
FY23 Synchronized Fielding																												
FY23 Architecture Design																												
FY23 Build & Integration																												
FY23 NEW Equipment Training (NET)																												
FY23 NEW Equipment Fielding (NEF)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
FY20 Synchronized Fielding	1	2018	2	2021
FY20 Build & Integration	3	2018	4	2020
FY20 NEW Equipment Training (NET)	1	2020	2	2021
FY20 NEW Equipment Fielding (NEF)	1	2020	2	2021
FY21 Synchronized Fielding	1	2019	2	2022
FY21 Architecture Design	1	2019	2	2020
FY21 Build & Integration	3	2019	4	2021
FY21 NEW Equipment Training (NET)	1	2021	2	2022
FY21 NEW Equipment Fielding (NEF)	1	2021	2	2022
FY22 Synchronized Fielding	1	2020	2	2023
FY22 Architecture Design	1	2020	2	2021
FY22 Build & Integration	3	2020	4	2022
FY22 NEW Equipment Training (NET)	1	2022	2	2023
FY22 NEW Equipment Fielding (NEF)	1	2022	2	2023
FY23 Synchronized Fielding	1	2021	2	2024
FY23 Architecture Design	1	2021	2	2022
FY23 Build & Integration	3	2021	4	2023
FY23 NEW Equipment Training (NET)	1	2023	2	2024
FY23 NEW Equipment Fielding (NEF)	1	2023	2	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>				Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</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
DY7: <i>Army Systems Engineering, Architecture & Analysis</i>	-	12.980	13.476	18.223	-	18.223	18.296	18.483	17.485	17.596	0.000	116.539
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Remaining OCSE Core Labor funding in DY3 will be realigned to DY7 in FY20. The balance of DY3 funding requirements will be realigned to the Army Future Command (AFC) in FY20 to support continued Joint Warfighter Assessments (JWA).

A. Mission Description and Budget Item Justification

This project provides the Army's leadership and materiel developers with the necessary modernization planning, System of Systems (SoS) engineering and analysis, technical risk analysis, architectural products, critical path analysis, cybersecurity and interoperability risk analysis and the associated mitigation planning for the Army's materiel portfolio. This project develops process, products, and policies that ensure a solid Army Systems Engineering construct across Army Program Executive and Management Offices.

This includes efforts in support of Common Operating Environment (COE) governance, the Army Futures Command's emerging development of concepts, requirements generation, resource allocation, experimentation, acquisition, logistics, and technology components of the Army Future Force Modernization Enterprise (FFME). Focus areas include the integration of key elements of a system into one overall system engineering construct and managing it through major system engineering activities to ensure the fielding of integrated capabilities meet the mission needs of the force against any potential adversaries. Key system engineering functions include, engineering and technical analysis, integrated System of Systems (SoS) architecture products, SoS risk analysis and mitigation planning to influence the Army's materiel portfolio. This project also includes the establishment of Army systems engineering policy and implementation standards, requirements decomposition and alignment, and resource and acquisition synchronization to address cross-portfolio issues. Key tasks are the development of integrated Architecture products; Engineering Analysis and Design; Portfolio Analysis; Systems Security Engineering process, interoperability assessments, Cybersecurity requirements analysis, compliance, and Cyber policy assessments.

The effort includes costs for labor (Government and contractor), support services, travel, training, supplies, facilities, and Information Technology (IT) support for Office of Chief Systems Engineer (OCSE). This effort funds Government labor for the Rapid Capabilities and Critical Technologies Office (RCCTO). This project also includes support to other Department of Defense (DOD) and international agencies for joint programs and collaboration effort.

Under this Project we have four efforts: Army System of Systems Engineering and Analysis, Cyber, Facilities/IT and Rapid Capabilities and Critical Technologies Office (RCCTO) Core Labor. The RCCTO core labor line is funded for RCCTO core labor for FY 2020 only. It supports the newly established FY 2020 RCCTO PROGRAM ELEMENT (PE) 0605054A PROJECT FI3 line which will fund the RCCTO projects.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Title: Army System of Systems Engineering and Analysis</p> <p>Description: Provided coordinated SoS engineering, architectures, and analysis products for integrating new technologies with existing capabilities to stakeholders (e.g. materiel developers, TRADOC Capability Manager (TCM), Army Capabilities Integration Center (ARCIC), etc.) to deliver integrated solutions to Army formations.</p> <p>FY 2020 Plans: Army Formation Reference Architecture products: Develop and maintain all Army Combat Formations (Corps & below) System of Systems architecture and integration products. These products are used to design Objective, Base, and Modified Table of Organization & Equipment (TOE) for demonstration/test environments (e.g. Integration Exercise, Operational Test, and Army Interoperability Certification), as a reference for analysis conducted by either OCSE or other Army organizations, and for determining fielding quantities and configurations. Army formations include Corps, Infantry/Cavalry/Armored Divisions, Infantry/Stryker/Armored Brigade Combat Teams and Regiments, Combat Aviation Brigades, Field Artillery Brigades, Engineer Brigades, and other formations that may be deployed temporarily or permanently, such as the Air Defense Artillery Brigade, to support specific warfighting functions.</p> <p>Four core recurring products are: - Basis of Issue (BOI) (Networked and Non-networked): detailed database and spreadsheets describing the objective, basic, and modified TOE, TRADOC required BOI system placements, network and subnet assignment data, etc. - SoS View Diagram: Visual reference document diagramming all Soldier and platform roles, and their network connectivity and waveform assignments to each other as dictated by the NBOI. - Vehicle Interconnectivity Diagram (VID): Visual reference document diagramming software (operating systems, applications, etc), hardware (radios, computers, antennae?s, routers/switches, etc.), internal/external networks (protocols, ports, gateways, etc.), and waveforms (frequency bands) are connected for individual platforms. - SoS Thread: Visual reference diagram documenting technical use cases of the SoS architecture and the data/message flows throughout Brigade and below based on Army universal task lists, Army Interoperability Certification, and Joint Common System Function List.</p> <p>Document and maintain the Army?s tactical-to-enterprise end-to-end system of systems architecture. These products provide a holistic view of the entire Army network for each of the geographic combatant commands (Africa Command (AFRICOM), Central Command (CENTCOM), European Command (EUCOM), Pacific Command (PACOM), Northern Command (NORTHCOM), and Southern Command (SOUTHCOM)) and are used to support deployment decisions of enterprise resources and analysis of the comprehensive network.</p>		8.260	10.249	14.283

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Provide subject matter expertise (SME) on the Army's enterprise and tactical SoS architecture to all Program Executive Offices (PEO) and in support of the Army's Modernization program. SME support includes providing reference blueprints for the Army's SoS architectures, assessment/test/deployment architecture development, and analysis planning for various Army activities ranging in scope from small training venues to full theatre events such as the Joint Warfighter Assessment.</p> <p>Engineering Design & Analysis: Analytic support will provide early insight into the technical health of key programs and to ensure leadership has the right data to make informed program decisions. Initial efforts will involve building the necessary MSBE infrastructure to allow end-to-end system evaluation against alternate courses of action through identification of critical interfaces and dependencies within programs against which key tasks are measured. The objective is an infrastructure, analytics, data, and processes that support continuous modernization of the Army to maintain overmatch. This vision will be achieved through four thrusts.</p> <p>Develop Model Based Systems Engineering (MBSE) that follows industry-standardized practices to develop SoS designs that fulfill key warfighter requirements. Funds will be used for development of the SoS model, maintenance/operation/training of the tools used to conduct modeling, and the production of output products. Perform cross-PEO System of system engineering, integration and performance analysis. Develop strategic plans for providing key technologies in support of Army critical gaps or shortfalls. Conduct analyses of technical and performance requirements to support technology insertion for Warfighter capability (i.e. Intel-related operations, spectral assignment risk mitigation, and PNT (Positioning, Navigation and Timing) architecture placement).</p> <p>Strategic Planning and Schedule Synchronization: These funds provide for strategic planning to achieve Army Modernization Objectives. Provides the ability to identify and track key milestones and interdependencies related to critical capabilities within the ASA(ALT) portfolio and Army Futures Command. Conduct schedule analysis to identify integration and fielding challenges and opportunities as well as track key capability readiness to meet Chief of Staff of the Army (CSA)/Army Modernization Objectives. These funds provide a reliable Integrated Master Schedule (IMS) that synchronizes key cross portfolio capabilities under development within a PoR and/or a Cross Functional Team. Efforts include implementation of IMS tools, analyses of Platform schedules, and key modernization components' schedules to identify issues and opportunities. These funds also provide for limited analysis of cross-cutting capabilities within the Program Executive Office (PEO) and Cross Functional Team portfolios to identify opportunities and challenges associated with implementation and fielding.</p> <p>Requirements Analysis:</p>				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>These funds provide for systems engineering analysis, synchronization, and tracking of PEO and Army S&T system development progress to ensure that Army Futures Command concepts, capabilities and requirements development is accurately reflected in program of records to successfully accelerate program acquisition. Synchronization of Army threats, concepts, capability gaps and documented requirements with modernization planning will enable early feasibility assessments, support trade studies, and execution of early systems engineering to inform decisions related to feasibility, affordability and sustainability of requirements.</p> <p>These funds provide for the development of cross Army Materiel Enterprise capabilities to synchronize threats, capabilities, gaps, requirements, programs, and interdependencies and ensure that acquisition programs support Army warfighting concepts and doctrine. These funds provide strategic planning to align Army modernization with requirements development. It provides analysis of objectives, identifies potential risks and mitigation plans to ensure capability delivery.</p> <p>Standards and Interoperability: This organization is charged with providing a wide range of technical coordination and oversight functions in support of the Army Modernization Strategy including, but not limited to the following primary mission areas:</p> <ol style="list-style-type: none"> 1) Early program lifecycle technical standards coordination and oversight 2) Establish and maintain the ASA(ALT) unified standards baseline in support of all material development efforts 3) Coordination with CIO/G-6 for analysis of requested standards waivers and tailored alignment of Title 40 interoperability certification with agile acquisition strategies 4) provide engineering and technical support to program office level Model Based Systems Engineering (MBSE) activities to establish a "single source of truth" that traces operational capabilities to mission architecture and into actionable system level standards implementation and tailored Capability Drop (CD) requirements all the way through Test, Evaluation, and Certification 5) Horizontal synchronization of Cross Functional Team (CFT) architecture and requirements development. <p>These funds support staffing needed for effective engagement, fulfillment of staff coordination and oversight responsibilities on behalf of the Army Acquisition Executive such as Architecture and Standards Integrated Product Team (IPT) leadership, and information management of a broad range of widely used work products that support acquisition planning and execution such as the following: studies & analysis, program technical reviews, joint and coalition liaison, Integrated Master Schedule (IMS), architecture system and service views, systems engineering documentation, and software and standards baseline configuration management.</p> <p>Systems Engineering Policy Support: Serves as the Army level concurrence authority on System Engineering Plans (SEP) and Program Protection Plans (PPP) for all Army Major Defense Acquisition Programs. Teams of subject matter experts conduct reviews of products to ensure compliancy to OSD and Army requirements. Army Representative for the FY 2014 NDAA Section 937 Congressional requirement to stand</p>				

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>up a Joint Federated Assurance Center (JFAC) to develop work plans, manage funding, track progress and report regular status to Army Leadership and OSD Leadership. In addition also maintains direct collaboration and communication with Army Research Developing Engineering Centers (RDECs), Army Research Labs, and specifically the Software, Hardware and Cyber Subject Matter Experts and Communities of Practice, to define, federate, maintain and evolve, Army Cyber, System Security Engineering, and allow access to available Assurance capabilities to meet today's threats and emerging threats. Conduct oversight, review, and development assistance for PPPs to determine/review risks/ vulnerabilities associated with Security Engineering Best Practices and assist with the development of sound mitigation strategies. Ensure program protection strategies use good systems engineering discipline and are referenced in the Systems Engineering Plan (SEP) and the Cyber Security Strategy (CSS). Provide advice and experience to influence system design in support of developing effective program protection strategies. Participate in the staffing of the PPP with applicable agencies across the Department of the Army (DA) staff. Conduct client advocacy and education forums (Road Show presentations) amongst Army PEOs, DASD(SE), other agencies and joint service stakeholders to inform and promulgate Critical Program Information (CPI) development best practices throughout the acquisition community. Interface as an executive agent on matters of Anti-Tamper and Supply Chain Risk Management with program personnel, systems security engineers and service providers. Act on behalf of the office of primary responsibility for Anti-Tamper and the Acquisition Security Database. Allows the Army to make informed tradeoffs that support system design and/or modification decisions upfront and early. Army systems require protection from proliferation and exploitation, for as long as possible, so they can effectively perform their missions in various operational environments. With OSD and Army laboratories ensure future access to state of the art microelectronics to reduce sole source dependence on microelectronics designs. Provide alternate assurance options for critical DoD unique parts as part of the US Microelectronic Strategy. Advance the Army's capability to perform hardware analysis of critical components transition to new microelectronics trust model that leverages commercial state of the art practices. Provide systems engineering advice on Critical Intelligence Parameter Breech recommendations through emerging Acquisition, Intelligence, Requirements (AIR) policy directives. Responsible for the conduct of Post-Preliminary and Critical Design Review (PDR/CDR) and Independent Technical Risk Assessments (ITRA) for all Army ACAT I and II programs where the Army Acquisition Executive serves as the Milestone Decision Authority. FY 2017 NDAA Sec 807 directs a change in Title 10 USC 2448b that the MDA will ensure an ITRA is conducted on all programs reaching MS A after 1 October 2016. The reviews will provide recommendations on Technical Risk and PDR/CDR sufficiency will be included in the Milestone Decision Authority (MDA) package for the Milestone Review, approval, and certification. Coordinate and prioritize requests for threat analysis of suppliers of critical components, assure the identification of mission critical functions and critical components as well as Trusted Systems and Networks (TSN) planning and implementation activities in Program Protection Plans. Assist in the conduct of criticality analysis to identify mission critical functions and critical components thus reducing the vulnerability of such functions and components through secure system design.</p> <p>Support the certification of Modular Open Systems Approach (MOSA) as defined in Title 10 USC, section 2446b (e). Confirm that Army programs proceeding to Milestone B have incorporated clearly defined major subsystem interfaces between the major</p>			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>

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

	FY 2019	FY 2020	FY 2021
<p>system platform and major system components, between major system components, and between major system platforms. That these major system interfaces are consistent with the widely supported and consensus-based standards that exist at the time of the milestone decision. Assess if Army programs have arranged to obtain specific, appropriate and necessary intellectual property rights with respect to such major system interfaces upon completion of the development of the major system platform. Lead the assessment of Reliability, Availability, and Maintainability (RAM) efforts of Army programs of record. Assist programs in the research for root causes of reliability issues and provide detailed assessment along with recommendation to senior leadership.</p> <p>Synchronize the Army's Modeling and Simulation Strategy with OSD's Digital Engineering Strategy to focus current and emerging efforts on the efficient development and use of M&S and Model Based Systems Engineering capabilities in order to advance the Army's system development efforts.</p> <p>Provide engineering support to OSD and the Army to oversee the growth of civilian talent to support Assistant Secretary of the Army (Acquisition, Logistics and Technology) Systems Engineering requirements. This includes recommending improvements in Training, Education, Rotational Assignments, and Mentoring a Systems Engineering (SE) work force across the Army. SEPS will support ASA(ALT) in the development of the Human Capital Strategic Plan (HCSP) and refinement of the System Engineering Functions with OSD.</p> <p>Common Operating Environment (COE): Provide Army representation at a wide spectrum of DoD and Industry professional forums for systems engineering, standards, and open design communities of practice.</p> <p>Provide formal staffing review and analysis of Service and DoD policy and strategy documents for impacts to Army modernization priorities, digital engineering, technical standards, and COE equities.</p> <p>Provide review and analysis of change requests and updates to the DoD Information Technology Standards Repository (DISR) baseline for impacts to Army inter and intra service interoperability with Joint and Coalition partners.</p> <p>Provide configuration management and knowledge management of approved Army baselines for architecture and technical standards in support of Common Operating Environment (COE) capability deliveries and Service level implementation of DoD Digital Engineering guidance and principles.</p> <p>Continue hosting systems engineering forums to promote convergence of legacy combat systems towards a common software and hardware infrastructure, effective migration of Army sensing capabilities towards common data sharing interface standards, and alignment of enterprise capabilities with tactical level services.</p>			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020	
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020
<p>Maintain enterprise wide Fielded Software Tracker Database via data curation, user requested functionality enhancements, systems administration, and user help desk support.</p> <p>Continue hosting bi-weekly and monthly systems engineering forums to optimize risk reduction and preparatory actions prior to execution of Army Interoperability Certification (AIC) test events.</p> <p>Host bi-weekly and monthly systems engineering forums to optimize risk reduction and preparatory actions prior to execution of Army Interoperability Certification (AIC) test events.</p> <p>FY 2021 Plans: Army System of Systems Engineering and Analysis:</p> <p>Develop reference architecture products to support CS21 Integrated Tactical Network fielding, the CS23 Integrated Tactical Network engineering design and integration planning, and the 2028 and 2035 baselines. Capability Set fielding activities occur every two years and provide network modernization upgrades to entire brigades in a single fielding event. These supporting architecture products enabled the ASA(ALT) community to determine integrated Basis of Issue planning, subnet design, spectrum allocation, network initialization, logistics planning for fielding activity, and non-recurring engineering planning and design as part of the overall ASA(ALT) engineering, integration and fielding of the Army Capability Sets.</p> <p>Continued development of the end-to-end Multi Domain Operations (MDO) architecture to support the Army Modernization Eco-System (AME). The MDO architecture is an end to end architecture describing of all the Army systems and their connections across the AME. Additionally, it can be used to identify touch point for Joint and Partner interconnectivity. Its primary purpose is the identification of gaps and issues in the AME, identification of solution options to solve those gaps and issues, and understanding how those solutions can</p> <p>Support the development and implementation of a governance process and structure to achieve unity-of-command and unity-of-effort across all AME stakeholder?s architecture development activities. Architecture, including all the underlying data that supports it, must be integrated through a repeatable process. A standards-based approach will be required to ensure the integration of data, processes, and tools across the AME. It is critical to synchronize the efforts of ASA(ALT), Army Futures Command (AFC), and CIO/G-6, applying a formal architecture methodology that utilizes common data.</p> <p>Using a Model Based Systems Engineering (MBSE) data-driven approach, capture system data in the system of systems integrated architecture to include systems? unique requirements, capabilities, performance, interfaces, standards, dependences,</p>			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020	
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020
<p>and data flows, within the context of their operational employment and provide visual representation of key system from an operational, functional and network perspective allowing for requirements traceability, reporting, analysis and visualization.</p> <p>Analyze Joint All Domain Command and Control (JADC2) impact on Army modernization strategy and the Army's role in MDO in the years 2028 and 2035. The JADC2 will change how the Army communicates within the Joint community. Through understanding of JADC2 is critical to ensuring that the Army will be able to function inside the Joint environment. Analysis will identify gaps and challenges that the Army faces operating in the JADC2 environment.</p> <p>Develop a reference architecture to support Sensor to Shooter (S2S) across Army and Joint forces. Connecting sensors digitally (i.e. machine to machine) to shooters is a challenge in the Army. This reference architecture will lay out a plan, through standards, protocols, and new and existing systems, for how the Army achieves this.</p> <p>Continue to provide the ASA(ALT) community with quick-turn, independent, first-order engineering analysis to support leadership decision making to enable the Army Modernization Eco-system.</p> <p>Lead for Army Systems Engineering Policy and Program Support:</p> <p>Leads the Army's development of policy and best practices to ensure systems engineering rigor in Army Acquisition. Primary advisor to the Army Acquisition Executive regarding the sufficiency of systems engineering rigor in programs. Collaborates with the Army's systems engineering community to identify systemic systems engineering challenges and issues and their solutions, as well as identifying and sharing best practices.</p> <p>As the National Defense Strategy and Army Senior Leadership have emphasized increased speed of delivery of capabilities to the Warfighter, OCSE will work with PEOs/PMs, along with the Combat Capabilities Development Command and other elements of Army Futures Command (AFC) on enabling processes and tools in order to accelerate the Army's acquisition process, from requirements development through delivery of capability to the field. Elements will include identifying and prioritizing key system attributes that provide the greatest operational effects on the battlefield, and support the fielding of an MDO-capable force by 2028 and an MDO-ready force by 2035. These efforts will encompass the development planning process to rapidly identify and refine requirements and speed development from concept to solution. OCSE will also work to assist the Army in assessing what emerging capabilities should be transitioned into programs of record, and facilitate the rapid integration of the technology.</p> <p>A key element of this will be advancing the state of practice of Digital Engineering (DE) across the Army Modernization Enterprise. This work will also seek to streamline communications between Government and Industry.</p>			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>OCSE leads the immediate Army response to NDAA statutory requirements that involve systems engineering, as well as identifying and facilitating the best means to institutionalize those requirements.</p> <p>OCSE leads Army interaction with OSD for systems engineering issues, and identifies and advocates for Army equities during the establishment of DoD policy involving systems engineering. In order to promote program success, the office assists programs in identification and mitigation of risk; or leads this effort when delegated by USD(R&E).</p> <p>Provides guidance and support to programs for development of systems engineering documentation required for milestone decisions and certification. Serves as the Army level concurrence authority on System Engineering Plans (SEPs) and provides systems engineering expertise for Program Protection Plans (PPPs) for all Army Major Defense Acquisition Programs.</p> <p>Army focal point for matters of hardware and software assurance , planning and countermeasures, and systems engineering focal point for program protection, including supply chain risk management, anti-tamper, and program protection plans. Army Representative for the FY 2014 NDAA Section 937 Congressional requirement to stand up a Joint Federated Assurance Center (JFAC) to develop work plans, manage funding, track progress and report regular status to Army Leadership and OSD Leadership. In addition, also maintains direct collaboration and communication with Combat Capabilities Development Commands (CCDCs), Army Research Labs, and specifically the Software, Hardware and Cyber Subject Matter Experts and Communities of Practice, to define, federate, maintain and evolve, Army Cyber, System Security Engineering, and allow access to available Hardware/Software Assurance capabilities to meet today's threats and emerging threats. Provide systems engineering expertise, oversight, review, and development assistance for PPPs to determine/review risks/identify vulnerabilities associated with Security. Provide advice and experience to influence system design considerations in support of developing effective and resilient program protection strategies. Conduct client advocacy and education forums (Road Show presentations/Army Systems Engineering Forums) amongst Army PEOs/CSEs,s, DASD(SE), other agencies and joint service stakeholders, to promulgate best practices to the acquisition community. Interface as an executive agent on matters of Anti-Tamper with program personnel, systems security engineers and service providers. Act on behalf of the office of primary responsibility for Software Assurance and Anti-Tamper. Provide alternate assurance options for critical DoD unique parts as part of the US Microelectronic Strategy. Advance the Army's capability to perform hardware analysis of critical components and transition to a new microelectronics trust model that leverages commercial state of the art practices. Provide systems engineering advice on Critical Intelligence Parameter Breach recommendations through emerging Acquisition, Intelligence, Requirements (AIR) policy directives. IAW FY 2017 NDAA Sec 807 Responsible for the conduct and execution of Post-Preliminary and Critical Design Review (PDR/CDR) and Independent Technical Risk Assessments (ITRA) for all Army ACAT I and II programs where the Army Acquisition Executive serves as the Milestone Decision Authority. The reviews will provide recommendations on Technical Risk and PDR/CDR sufficiency will be included in the Milestone Decision Authority (MDA) package for the Milestone Review, approval, and certification.</p>			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>OCSE develops Modular Open Systems Approach (MOSA) policy and implementation guidance, iaw NDAA FY 2017 2466a/b/c/, that leads to the certification of MOSA in MDAPS. Other responsibilities include confirming that Army programs proceeding to Milestone B have incorporated clearly defined major subsystem interfaces between the major system platform and major system components, between major system components, and between major system platforms, and that these major system interfaces are consistent with the widely supported and consensus-based standards.</p> <p>Leads the assessment of Reliability, Availability, and Maintainability (RAM) efforts of Army programs of record. Assist programs in the research for root causes of reliability issues and provide detailed assessment along with recommendation to senior leadership.</p> <p>Synchronizes the Army's Modeling and Simulation Strategy with OSD's Digital Engineering Strategy to focus current and emerging efforts on the efficient development and use of M&S and Model Based Systems Engineering capabilities in order to advance the Army's system development efforts.</p> <p>Promotes workforce development efforts to improve the level of systems engineering competency. Provide engineering support to OSD and the Army to oversee the growth of civilian talent to support Assistant Secretary of the Army (Acquisition, Logistics and Technology) Systems Engineering requirements. This includes recommending improvements in Training, Education, Rotational Assignments, and Mentoring for a Systems Engineering (SE) work force across the Army. SEPS will support ASA(ALT) in the development of the Human Capital Strategic Plan (HCSP) and refinement of the System Engineering Functions with OSD.</p> <p>Standards & Interoperability:</p> <p>Common Operating Environment Systems Engineering Governance: Continue hosting ASA(ALT) monthly governance forums to promote convergence of legacy combat systems towards a common software and hardware infrastructure, effective migration of Army sensing capabilities towards common data sharing interface standards, and alignment of enterprise capabilities with tactical level services.</p> <p>Continue hosting bi-weekly ASA(ALT) Configuration Control Board to optimize risk reduction and preparatory actions prior to execution of CIO/G-6 Title 40 Army Interoperability Certification (AIC) test events.</p> <p>ASA(ALT) Systems Engineering Artifacts: Continue configuration and knowledge management of the Army technical data baseline in support of achieving Full Operational Capability (FOC) of the Common Operating Environment (COE) in 2025.</p>				

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Continue maintenance of the enterprise level Fielded Software Tracker Database via data curation, user requested functionality enhancements, systems administration, and user help desk support.</p> <p>Joint All Domain Command & Control (JADC2) / Multi Partner Environment (MPE) Technical Standards: Continue ASA(ALT) technical representation on the Army Joint All-Doman Command & Control (JADC2) liaison team to the Air Force Executive Agent Office.</p> <p>Continue ASA(ALT) technical representation on the Information Technology Standards Steering Group (ITSSG) and Interoperability Standards Technical Packages (ITSP) in support of pre-coordination, review, and staffing of Communities of Practice (CoP) and Change Requests (CRs) to the DoD Information Technology Standards Repository (DISR) baseline IAW DoDI 8310.01.</p> <p>Continue ASA(ALT) technical representation for Army pre-ratification review and staffing of American, British, Canadian, Australian, and New Zealand (ABACANZ) Technical Statement of Requirements (TSOR) in support of the Army Interoperability Campaign Plan and Mission Partner Environment (MPE) Concept of Operations (CONOPS).</p> <p>Mission Engineering and Integration, Requirements and Feasibility Analysis: Continue prioritization of FFME modernization efforts and ensure that appropriate metrics are developed and used to confirm that materiel developed meets warfighter needs. Perform pre-MDD feasibility and requirements analysis and, with AFC, develop and execute a process to ensure that appropriate systems of systems integrations, design for supportability, cyber resilience, and other important design characteristics are addressed in new system designs. Lead development of a coordinated, comprehensive Army Mission Engineering approach across the FFME and ensure that products are used to inform Army modernization prioritization and resourcing decisions.</p> <p>Planning of ASA(ALT) Integration Into the Army Data Strategy: ASA(ALT) Acquisition Data Domain (ADD) supports Army readiness and modernization through the establishment of the Acquisition Data Working Group and Product Engineering Working Group (PEWG) with representatives from across ASA(ALT), Army Futures Command (AFC), and other stakeholders. Efforts within the ADD support the development and demonstration of capabilities within previously established data platforms through minimal viable products (MVP) of use case that are implemented and scaled to support the Army Modernization Enterprise (AME). ADD efforts provides a path for ASA(ALT) to provide common enterprise data in a manner that integrates the product life cycle and includes all the processes that are needed to design, develop, test, produce, and support a product. Coordinate and implement standards and process for technical data in order</p>				

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>to gain efficiencies across the acquisition and modernization initiatives. Ensure that technical data is available for successful integration and support of product and program life-cycle support, additive and advanced manufacturing, digital engineering, intellectual property management, modular open systems approach and other Army Modernization Enterprise initiatives. Connecting these processes using standardized digital tools and data accelerates the product development cycle and lowers costs for support and new capability integration. This will advance data analytics, standards and visualization capabilities while adding common platform services in a big data environment that is consistent with private industry. Pilot and MVP efforts will establish and mature data standards, governance, and security of common enterprise data in support of Army readiness and modernization priorities.</p> <p>Tasks:</p> <ul style="list-style-type: none"> - Establish Acquisition Data Domain (ADD) governance, standards, and policies in order to facilitate rapid and relevant acquisition decisions. - Provide common enterprise data in accordance with NDAA 2018 across the ASA(ALT) enterprise. - Establish and coordinate implementation of technical data standards and governance throughout the Army Modernization Enterprise. - Demonstrate data decision platform capabilities throughout the product lifecycle. - Demonstrate used case implementation through Minimal Viable Products (MVP) with the potential to scale across ASA(ALT) portfolios. <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase in funding due to realigning remaining OCSE Core Personnel dollars formerly residing in Projects DZ6 and DY3.</p>				
<p>Title: COE</p> <p>Description: Provide governance and implementation oversight and for the Army SoS Common Operating Environment (COE) and synchronized programmatic planning for COE crossing multiple PEOs and Computing Environments (CEs) in coordination with the Army Staff, Training and Doctrine Command, Research and Development Command, Army Materiel Command, Army Testing and Evaluation Command, the Joint Staff and OSD Staff. This includes providing integrated, cross-portfolio system engineering technical products and configuration management cost benefit analysis, support for TRADOC requirements development and G-8 staffing through AROC approval. Lead COE standards development in support of Army and DoD Standards bodies and integrated architecture development. Provide COE related Verification & Validation (V&V) planning and assessment including management of the Federated Integration Environment, Cross-CE risk reduction and Army Interoperability Certification. Serve as the DA Staff advocate for COE and Cross-Cutting Capabilities (CCCs) development and Application Migration. Provides funding for supervision of Subject Matter Expert Staff used to support execution the tasks following.</p>		1.198	-	-
<p>Title: Cyber</p>		3.310	2.821	3.700

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
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Description: This project funds cyber support to PEOs/PMs to include cybersecurity support to risk management framework, cyber engineering and architecture development, industry cybersecurity engagement, and cyber program oversight and governance, which ensures the secure, affordable, and effective delivery of Army materiel solutions that address critical Army modernization objectives, as well as the delivery of agile and advanced cyber solutions to equip the Army's offensive and defensive forces in the cyberspace domain. These funds support synchronization, analysis and integration of Cyber functions and products.

FY 2020 Plans:

Strategic:
Lead a coordinated, comprehensive acquisition approach to enhance cyber resiliency and survivability across ASA(ALT) communities and the materiel enterprise. Optimize cybersecurity as a critical enabler of capability delivery. Facilitate and ensure execution of cyber-related tasks and efforts by appropriate ASA(ALT) organizations. Represent and advocate for ASA(ALT) cyberspace equities in external governance bodies, senior leader forums, and partner engagements. Shape cyberspace policy, directives and orders that may impact acquisition. Deliver systemic and crosscutting value to PMs executing cyber-related missions.

Cybersecurity:

Lead the cybersecurity program for ASA(ALT). Fulfill cybersecurity functions mandated by public law, federal directives, and DoD/Army policy, and ensure PEOs and organizations meet all requirements. Perform delegated Authorizing Official functions for ASA(ALT), ensuring HQ Business systems maintain an acceptable level of risk and continue authorization throughout the system lifecycle. Provide oversight and management standards for the ASA(ALT) cybersecurity workforce. Support PEOs in implementing the Risk Management Framework, communications security (COMSEC) management, Federal Information Security Management Act (FISMA) compliance, and Command Cyber Readiness Inspections (CCRI). Provide technical support to facilitate compliance with ARCYBER orders and directives addressing software updates, patching, reporting, and named cyber operations.

Support the secure operation of ASA(ALT) activities. Lead coordination across PEOs in preparing for both planned and unannounced Command Cyber Readiness Inspections (CCRI). Assist local Network Enterprise Centers as needed to support ASA(ALT) equities. Engage 7th Signal Command as the PEO liaison. Report to HQDA CIO/G-6 and ARCYBER for cybersecurity related requirements and issues. Monitor and coordinate response to the various cybersecurity inspection programs and audit findings related to Department of Defense Inspector General (DoDIG), APPA, and Army Audit Agency (AAA) audits.

	FY 2019	FY 2020	FY 2021

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Co-lead RMF process improvement initiatives for the Army, lead for ASA(ALT). In connection with (ICW) HQDA CIO/G-6 and NETCOM, ensure resources are available to conduct further pilot efforts. Develop policies, procedures, and lessons learned to ensure RMF optimization for the Army.</p> <p>Co-lead the ASA(ALT) Chief Information Officer (CIO)/Chief Information Security Officer (CISO) Council. Ensure PEO involvement and coordination to meet the objectives and requirements identified in the council charter.</p> <p>Support critical modernization of unsupported software for secure operations. Monitor and facilitate PEO/PM migration plans and execution away from unsupported client/server operating systems and applications (e.g. Windows 10, Server 2003). Assist and respond with data call requests, synchronization efforts, and IPRs with DoD CIO, HQDA CIO/G-6, ARCYBER, and the Vice Chief of Staff of the Army (VCSA). Provide required data to support DoD Cybersecurity Scorecard.</p> <p>Coordinate DoD and Army requirements for public key infrastructure (PKI) and Multi-Factor Authentication across PEOs and PMs. Coordinate and review all program briefings, and input to the PKE Exemption SharePoint site.</p> <p>Coordinate priorities and tasks for ASA(ALT) from senior leadership forums such as the CIO Executive Board (CIO-EB).</p> <p>Provide holistic expertise and support for Cross-Domain Solutions (CDS). Establish and facilitate Army Tactical CDS WG to provide collaboration among tactical program stakeholders. Identify requirements and interoperability issues affecting multiple systems in the tactical space. Evaluate emerging CDS technologies for the tactical environment and provide feedback to industry to shape investments.</p> <p>Mission Assurance/Resilience & Engineering: Facilitate technical exchange across ASA(ALT) community by maintaining Cyber Focal SharePoint site to collect and main PoR data as needed. Offload legacy data to authoritative sources/repositories as feasible. Facilitate internal coordination across Cyber Focal.</p> <p>Support Cyber Operational Resiliency Assessment-Platform (CORAP) program. Facilitate identification, prioritization, and approval of vulnerability mitigations and advanced cyber hardening efforts for critical systems. Leverage lessons learned and analyses opportunities to further cyber resiliency goals.</p> <p>Enhance cyber assessments within acquisition process. Coordinate with testing community, PMs/PEOs, OSD/Joint Staff, to implement improvements to cyber assessment process across all ASA(ALT) lifecycles. This process will build on the community-established needs to better integrate testing (Red/Blue/Cyber Ranges), supply chain risk management (beyond Trusted</p>				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Systems & Networks process), cyber teams (certification/standards), threat capabilities/intent, and risk-to-mission perspective. Institutionalize lessons learned and guidance via Army Acquisition Executive (AAE) directive for PM training and implementation.</p> <p>Enhance cyberspace acquisition governance. Operationalize the Cyber Acquisition Task Force (CATF) to synchronize and prioritize cyberspace capabilities in coordination with other critical governance forums. Army requires whole-of-service governance approach to accelerate and provide flexible delivery of cyberspace capabilities. Establish clear battle-rhythm with TCM Cyber, ARCYBER, and DAMO-CY G-3/5/7 working and assessment group. Integrate with CCIDS Configuration Control Board (CCB) and Cyberspace Requirements Evaluation Board (CREB). Ensure communications across the community.</p> <p>Provide ASA(ALT) technical representation and expertise at Unified Platform (UP) and Joint Cyberspace Command & Control (JCC2) decision forums. Ensure technical compatibility of joint efforts with current/planned Army systems across PEOs and advocate for Army programmatic equities in cyberspace. Specifically, Army will maximize coordination of Army capability and materiel development, to ensure both align to and support UP/JCC2 objectives. Improve communication and information sharing across all stakeholders to support PEO interests.</p> <p>Improve ASA(ALT) System Security Engineering (SSE). Set conditions for the formal appointment of the SSE workforce within each PEO. Establish duties with prescribed training, experience, and certification requirements IAW DoD 8570. Facilitate collaboration across ASA(ALT), and with the cybersecurity community.</p> <p>Improve cyberspace supply chain risk management (CySCRM). Support OCSE efforts with Army CySCRM WG to maintain readiness of Army forces, capabilities, and systems by identifying, scoping, and mitigating risks to the supply chain. The WG will provide a forum for stakeholders to review intelligence reports and assessments related to SCRM; review current SCRM policies, roles, and responsibilities; identify potential gaps; recommend mitigations; in accordance with AR 70-77, maximize the integration of SCRM across system lifecycles; and interface with joint and interagency SCRM activities to ensure whole-of-government execution.</p> <p>As needed, conduct engineering assessments of crosscutting cyber focused architectures, solutions, and capabilities proposed by PORs, CFTs, and RCO.</p> <p>FY 2021 Plans: Summary:</p> <p>Perform the functions of the Principal Cyber Adviser (PCA) to the AAE, ASA(ALT) Chief Information Security Officer (CISO), ASA(ALT) Engineering Governance for Cyberspace, and ASA(ALT) lead for Cyber Resilience. Lead a coordinated,</p>				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>

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

comprehensive acquisition approach to enhance cyber resiliency and survivability across ASA(ALT) communities and the materiel enterprise. Optimize cybersecurity as a critical enabler of capability delivery. Facilitate and ensure execution of cyber-related tasks and efforts by appropriate ASA(ALT) organizations. Represent and advocate for ASA(ALT) cyberspace equities in external governance bodies, senior leader forums, and partner engagements. Shape cyberspace policy, directives and orders that may impact acquisition. Deliver systemic and crosscutting value to PMs executing cyber-related missions. Army Futures Command (AFC). Engage AFC to institutionalize support for ASA(ALT) Cyber Discipline in order to begin system survivability and cyber resilience efforts early in the acquisition lifecycle.

Principal Cyber Adviser (PCA) to the AAE:

Provide the AAE with subject matter expertise on acquisition interests related to cyberspace. Topics include the development of decisive cyberspace systems, the survivability/resilience of cyber-dependent systems, the evolution of pre-acquisition cyberspace requirements / capability development, and the continued use of systems throughout Operations & Support. Advise emerging developments and policies in cyberspace from joint, interagency, and coalition partners. Monitor and advise relevant threats to Army systems, and develop mitigation roadmaps as required. Principal ASA(ALT) cyber representative for coordination across government agencies, industry, and academia.

ASA(ALT) Chief Information Security Officer (CISO). Lead, plan, integrate and synchronize cybersecurity efforts across ASA(ALT) including PEOs and headquarters. Lead the ASA(ALT) CIO/CISO Council in order to identify crosscutting issues and opportunities from across the PEOs requiring ASA(ALT) senior leader attention. Represent ASA(ALT) cybersecurity equities in external stakeholder forums (e.g. Army Cyberspace Council, Army Enterprise Network Council, CIO Executive Board). Review and shape all cyberspace related strategies, policies, and orders affecting ASA(ALT) from OSD, HQDA, and ARCYBER; and elevate issues to the ASA/PDEP/MDEP as needed. Synchronize architectures between enterprise and acquisition systems. Support critical modernization of unsupported software for secure operations. Assist and respond with data call requests, synchronization efforts, and IPRs with DoD CIO, HQDA CIO/G-6, Army Cyber Command (ARCYBER), and the Vice Chief of Staff of the Army (VCSA). Examples: Federal Information Security Modernization Act (FISMA), DoD Cybersecurity Scorecard, Windows / unsupported software migrations, HQDA Execution Orders (EXORD), Army Cyber Command (ARCYBER) Operations Orders (OPORD). Leverage cybersecurity policy as a technology enabler. Fulfill cybersecurity functions mandated by public law, federal directives, and DoD/Army policy. Coordinate, optimize, and monitor RMF execution among PEOs, assist with common issues requiring senior leader attention, and liaise with HQDA CIO/G-6. Ensure appropriate transfer of Enterprise Mission Assurance Support Service (eMASS) records for systems that transitioned to sustainment. Review and approve requirements for Communications Security (COMSEC) materiel. Serve as approval authority for ASA(ALT) HQ eMASS accounts and Army Training & Certification Tracking System (ATCTS) records, as well as for reviewing and approving system transfers to sustainment in the Army Program Management System (APMS).

FY 2019	FY 2020	FY 2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>ASA(ALT) Engineering Governance for Cyberspace. Provide engineering governance for emerging cyberspace-related capabilities and advances to include artificial intelligence, cloud-computing governance, DevSecOps, supply chain risk management, etc. Ensure ASA(ALT)'s cyber-related roadmaps align with Army/DoD CIO regarding data, cloud migration, data centers, etc. Analyze requirements and opportunities, and publish ASA(ALT) internal Technical Bulletins and other information papers to inform PMs. Drive definition and implementation of Information Security Architectures from a system-of-systems perspective. As needed, conduct engineering assessments of crosscutting cyber focused architectures, solutions, and capabilities proposed by PORs, CFTs, and RCCTO.</p> <p>ASA(ALT) lead for Cyber Resilience:</p> <p>Coordinate updates to the ASA(ALT) Cyber Discipline Policy and Implementation Guidebook and transition to Army policy. Synchronize ASA(ALT) cyber resilience strategy with DoD CIO, OUSD(A&S), and HQDA CIO/G-6. Coordinate with Army Futures Command to accelerate the delivery of survivable systems by integrating resilience requirements early in capability development. Review Cyber Discipline related artifacts before submission to the MDA in support of milestone decision reviews. Coordinate support with stakeholders from across Army to implement effectively across system lifecycles. Coordinate revisions and adapt to regulation as needed. The ASA(ALT) Cyber Discipline positions the Army to fight and win with agility in a congested and contested cyberspace domain by maximizing survivability and resiliency of Army systems. This policy mandates the need for PMs to integrate threat-driven systems security engineering, to include cyber assessments and mitigations, both early and continuously across system lifecycles. This policy builds upon of the Risk Management Framework (RMF) and can inform compliance decisions. This implementation guide describes the roles and responsibilities for Milestone Decision Authorities (MDA), PEOs, and PMs. This discipline empowers the PM to expend resources and consider cyber resiliency within trade space decisions along with cost, schedule, and performance.</p> <p>Cyber Vulnerability Assessments & Mitigations ? ASA(ALT) Enduring Program:</p> <p>Lead ASA(ALT) effort to institutionalize cyber vulnerability assessments and mitigations over system lifecycles. Plan funding over the Future Year Defense Program and manage distributed execution by the supporting organizations. Coordinate with system owners to integrate funding as part of organic acquisition strategies. Define Terms of Reference with stakeholders across Army. Coordinate all assessment/mitigation reporting to Army, joint and DoD forums. Support prioritization of weapon systems for assessments based on COCOM prioritization. Establish repository of Army lessons learned for mitigations. Synchronize legacy-focused efforts with current efforts to expand cyber assessment and mitigation planning / implementation earlier in the development lifecycle for all acquisition systems, i.e. ASA(ALT) Cyber Discipline. In parallel, lead Cyberspace Operational Resiliency Assessment - Platform (CORA-P) as the Army-supported organization and oversee planning, execution and reporting of overall CORA-P activities. This effort will support weapon system prioritization and assessment by understanding which</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>weapon systems are critical to combatant commanders, and then assessing those systems in an operational environment. Integrate into planning cycle for a currently-schedule COCOM exercise. Conduct multiple CTTX throughout event planning cycle, with iterative feedback to event planners and system owners. Deliver final vulnerability assessment report (VAR) to COCOM and system owners. Integrate CORA-P / CTTX lessons learned into program planning and execution. After baselining this process, conduct multiple assessments throughout the fiscal year. This effort will 1. identify weapon systems (including relevant networks) that are critical to combatant commanders in an operational environment; 2. identify cyberspace vulnerabilities within prioritized weapon systems; 3. identify system-based risk to mission for combatant commanders; and 4. coordinate the mitigation of vulnerabilities with system and network owners. Ultimately, this effort will accelerate the delivery of critical mitigations to the weapon systems designated as critical assets / key terrain in cyberspace by Combatant Commanders.</p> <p>ASA(ALT) lead for System Security Engineering (SSE):</p> <p>Army requires a professional and effective systems security engineering (SSE) workforce, which is separate from information system security management (ISSM) or network defense functions. SSE contributes to a broad-based, holistic security perspective and focus within the systems engineering (SE) discipline. SSE ensures stakeholder protection needs and security concerns are properly identified and addressed in all engineering stages of the system life cycle. Coordinate with OUSD to define the DoD body of knowledge for SSE. Ensure duties align with prescribed training, experience, and certification. Coordinate appointment and implementation, and facilitate collaboration across PEOs through meetings and publications.</p> <p>ASA(ALT) Enterprise Systems:</p> <p>Support the CSE as Authorizing Official (AO) for ASA(ALT) headquarters. Perform the duties of Program Information System Security Management (P-ISSM) to include guiding HQ system owners in achieving Authorizations To Operate (ATO) and then continuously monitoring systems throughout operations.</p> <p>Major Incident Response (as needed):</p> <p>As needed, coordinate ASA(ALT) strategic response for major malware / computer incidents and Command Cyber Operational Readiness Inspections (CCORI). Engage 7th Signal Command as the PEO liaison. Report to HQDA CIO/G-6 and ARCYBER for cybersecurity related requirements and issues. Monitor and coordinate response to the various cybersecurity inspection programs and audit findings related to DoD Inspector General and Army Audit Agency.</p> <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></p>				

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Increase in funding due to realigning remaining OCSE Core Personnel dollars formerly residing in Projects DZ6 and DY3.			
Title: Facilities and IT Support	0.212	0.076	0.240
Description: Provides funding for infrastructure/facilities and IT support.			
FY 2020 Plans: Provides funding for infrastructure/facilities. It includes the costs for purchasing/leasing hardware, software, computers, communications equipment and services.			
FY 2021 Plans: Provide funding for infrastructure/facilities. It includes the costs for purchasing/leasing hardware, software, computers, communications equipment and services.			
FY 2020 to FY 2021 Increase/Decrease Statement: Increase in funding due expected computer purchases.			
Title: FY 2020 SBIR/STTR Transfer	-	0.330	-
Description: Funding transferred in accordance with Title 15 USC ?638			
FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638			
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	12.980	13.476	18.223

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
• DY3: <i>NIE Test & Evaluation</i>	13.907	16.851	0.000	-	0.000	-	-	-	-	-	Continuing
• DY5: <i>Production/Field</i>	2.351	2.157	1.045	-	1.045	0.975	0.897	1.147	1.146	-	Continuing
<i>Coordination for Capability Sets</i>											
• DZ6: <i>Army Integration Management & Coordination</i>	18.792	5.819	0.000	-	0.000	-	-	-	-	-	Continuing
Remarks											

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>

D. Acquisition Strategy

This project does not have any requirement for direct procurement of hardware or software.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.330		-		-		-	0.000	0.330	-
Subtotal			-	-		0.330		-		-		-	0.000	0.330	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Army System of Systems Engineering and Analysis	TBD	TBD : Various	44.603	-		-		-		-		-	0.000	44.603	-
Common Operating Environment (COE)	TBD	TBD : Various	12.969	-		-		-		-		-	0.000	12.969	-
Cyber	TBD	TBD : Various	4.764	-		-		-		-		-	0.000	4.764	-
Army System of System Engineering and Analysis Core Labor	Allot	SoSE&I : Various	6.479	4.522	Nov 2018	4.746	Nov 2019	7.537	Nov 2019	-		7.537	Continuing	Continuing	-
Army System of System Engineering and Analysis Matrix Labor	MIPR	CERDEC : Various	1.482	0.913	Nov 2018	0.851	Nov 2019	1.742	Nov 2019	-		1.742	Continuing	Continuing	-
Army System of System Engineering and Analysis SETA Labor	C/CPFF	TBD : Various	3.091	1.025	Nov 2018	0.949	Nov 2019	3.825	Nov 2019	-		3.825	Continuing	Continuing	-
Army System of System Engineering and Analysis FFRDC Labor	FFRDC	MITRE : Various	3.956	3.742	Nov 2018	3.530	Nov 2019	1.246	Nov 2019	-		1.246	Continuing	Continuing	-
Common Operating Environment (COE) Core Labor	Allot	SoSE&I : Various	1.161	0.150	Nov 2018	0.117	Nov 2019	0.175	Nov 2019	-		0.175	Continuing	Continuing	-
Cyber Core Labor	Allot	SoSE&I : Various	2.076	0.977	Nov 2018	1.836	Nov 2019	2.218	Nov 2019	-		2.218	Continuing	Continuing	-
Cyber Matrix Labor	MIPR	CERDEC : Various	0.300	0.391	Nov 2018	0.236	Nov 2019	0.418	Nov 2019	-		0.418	Continuing	Continuing	-
Cyber SETA Labor	C/CPFF	TBD : Various	0.248	0.206	Nov 2018	0.191	Nov 2019	0.358	Nov 2019	-		0.358	Continuing	Continuing	-
Cyber FFRDC Labor	FFRDC	MITRE : Various	0.633	0.503	Nov 2018	0.537	Nov 2019	0.704	Nov 2019	-		0.704	Continuing	Continuing	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
RCO Core Labor	C/BA	TBD : VA	-	-		-		0.000	Nov 2019	-		0.000	-	-	-
FY 2019 SBIR / STTR Transfer	TBD	Various : None	-	0.339		-		-		-		-	0.000	0.339	-
Subtotal			81.762	12.768		12.993		18.223		-		18.223	Continuing	Continuing	N/A

Remarks
 Note: 1
 - Program Activities performed at Aberdeen Proving Ground (MD), Taylor Bldg, (Crystal City, VA), Pentagon, (Washington DC), TACOM (Warren, MI)

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Facilities and IT Support	TBD	Various: Note: 1 : TBD	4.177	0.212	Nov 2018	0.153	Nov 2019	-		-		-	0.000	4.542	-
Subtotal			4.177	0.212		0.153		-		-		-	0.000	4.542	N/A

Remarks
 Note:1
 - Program Activities performed at Aberdeen Proving Ground (MD), Taylor Bldg, (Crystal City, VA), Pentagon, (Washington DC), TACOM (Warren, MI)

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
	85.939	12.980	13.476	18.223	-	18.223	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</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
CS19 LTI Integration	█																											
CS19 Receive Kits (Production)	█	█																										
Capability Set (CS) Design:																												
CS20 Architecture Design	█	█	█																									
CS21 Architecture Design	█	█	█	█	█	█	█	█																				
CS22 Architecture Design					█	█	█	█	█	█	█	█																
CS23 Architecture Design									█	█	█	█	█	█	█	█												
CS24 Architecture Design													█	█	█	█	█	█	█	█								
Common Operating Environment (COE):																												
COE V3.0 AIC	█	█																										

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
CS19 CS TDP (A/B Kit Design)	1	2018	2	2018
CS21 Golden Vehicle / NRE List [ABCT/SBCT]	4	2017	4	2018
CS21 Preliminary Reference IBOI [IBCT]	4	2017	2	2018
CS20 Unit NBOI (NRE Baseline) IBCT	1	2018	3	2018
CS20 Golden Vehicle / NRE List	1	2018	4	2018
CS19 Procurement	3	2018	4	2018
CS19 LTI Integration	4	2018	1	2019
CS19 Receive Kits (Production)	4	2018	2	2019
Capability Set (CS) Design:	1	2018	4	2019
CS19 Architecture Design	1	2017	2	2018
CS20 Architecture Design	1	2018	2	2019
CS21 Architecture Design	1	2019	2	2020
CS22 Architecture Design	1	2020	2	2021
CS23 Architecture Design	1	2021	2	2022
CS24 Architecture Design	1	2022	2	2023
Common Operating Environment (COE):	1	2018	4	2019
COE V3.0 CPCE/MCE CDR	1	2018	1	2018
COE V3.0 CPCE/MCE OT at NIE 18.2	4	2018	4	2018
COE V3.0 AIC	1	2019	1	2019

Note

Capability Set (CS)

Common Operating Environment (COE):

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>
Army Interoperability Certification (AIC), Command Post Computing Environment (CPCE), Critical Design Review (CDR), Mounted Computing Environment (MCE), Network Integration Evaluation (NIE), Operational Test (OT)		

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>				Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</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
DZ6: <i>Army Integration Management & Coordination</i>	-	18.792	5.819	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	24.611
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project funds resources that support the technical and management (i.e. headquarters, resource management, acquisition, human resources, and operations) aspects of the Army Rapid Capabilities and Critical Technologies Office (RCCTO). Effectively utilizing these resources reduces overall cost to the program. All core RCCTO personnel costs will be funded out of this project.

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

	FY 2019	FY 2020	FY 2021
<p>Title: Program Management and Integration</p> <p>Description: This effort funds resources that support the Army Rapid Capabilities and Critical Technologies Office (RCCTO).</p> <p>FY 2020 Plans: This project funds Government Labor, specifically resources that provide program management, resource management, acquisition, human resources, and operations aspects of the Army Rapid Capabilities and Critical Technologies Office (RCCTO).</p> <p>Funding for RCCTO Government technical resources aligned under project DY7.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funds reduced due to army priorities.</p>	18.014	5.790	-
<p>Title: Facilities and IT Support</p> <p>Description: Provides funding for the Army Rapid Capabilities and Critical Technologies Office (RCCTO) - Core Labor</p>	0.778	-	-
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	-	0.029	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	18.792	5.819	-

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
• DY3: <i>NIE Test & Evaluation</i>	13.907	16.851	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• DY5: <i>Production/Field Coordination for Capability Sets</i>	2.351	2.157	1.045	-	1.045	0.975	0.897	1.147	1.146	Continuing	Continuing
• DY7: <i>Army Systems Engineering, Architecture & Analysis</i>	12.980	13.476	18.223	-	18.223	18.296	18.483	17.485	17.596	Continuing	Continuing

Remarks

D. Acquisition Strategy

This project does not have any requirement for direct procurement of hardware or software.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.029		-		-		-	0.000	0.029	-
Subtotal			-	-		0.029		-		-		-	0.000	0.029	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
SoSE&I Program Management and Integration	TBD	Various Note: 1 : TBD	36.340	17.936	Nov 2018	5.790	Nov 2019	-		-		-	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	Various : None	-	0.078		-		-		-		-	0.000	0.078	-
Subtotal			36.340	18.014		5.790		-		-		-	Continuing	Continuing	N/A

Remarks
 Note: 1
 - Program Activities performed at Aberdeen Proving Ground (MD), TACOM (Warren MI), Taylor Bldg, (Crystal City, VA), Pentagon, (Washington DC).

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Facilities and IT Support	TBD	Various Note: 1 : TBD	4.520	0.778	Nov 2018	-		-		-		-	Continuing	Continuing	Continuing
Subtotal			4.520	0.778		-		-		-		-	Continuing	Continuing	N/A

Remarks
 Note:1
 - Program Activities performed at Aberdeen Proving Ground (MD), TACOM (Warren MI), Taylor Bldg, (Crystal City, VA), Pentagon, (Washington DC), FT Bliss (TX), White Sands Missile Range (NM).

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</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								
NIE 18.2 Planning -- Execution																																				
Capability Set 18 Fieldings																																				
CS18 New Equipment Training (NET)																																				
CS18 New Equipment Fielding (NEF)																																				
JWA 19.1 Planning -- Execution																																				
AWA 19.1 Planning/Prep - ValEx/CommEX/Pilot																																				
AWA 19.1 Event																																				
AWA 19.1 Event Analysis & Summary																																				
Capability Set 19 Fieldings																																				
NIE 18.2 Planning - Execution																																				
JWA 19.1 Planning - Execution																																				
NIE 19.2 Planning - Execution																																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Capability Set 17 Fieldings	1	2015	1	2018
CS17 New Equipment Training (NET)	1	2017	2	2018
CS17 New Equipment Fielding (NEF)	1	2017	1	2018
JWA 18.1 Planning -- Execution	4	2017	3	2018
AWA 18.1 Event	1	2018	1	2018
AWA 18.1 Event Analysis & Summary	3	2018	3	2018
NIE 18.2 Planning -- Execution	1	2018	1	2019
NIE 18.2 Planning/Prep - ValEx/CommEX/Pilot	4	2016	3	2018
NIE 18.2 Event	3	2018	3	2018
NIE 18.2 Event Analysis & Summary	3	2018	4	2018
Capability Set 18 Fieldings	1	2016	1	2019
CS18 Build and Integration	3	2016	4	2018
CS18 New Equipment Training (NET)	1	2018	2	2019
CS18 New Equipment Fielding (NEF)	1	2018	1	2019
JWA 19.1 Planning -- Execution	4	2018	3	2019
AWA 19.1 Planning/Prep - ValEx/CommEX/Pilot	3	2016	1	2019
AWA 19.1 Event	1	2019	1	2019
AWA 19.1 Event Analysis & Summary	1	2019	2	2019
Capability Set 19 Fieldings	1	2017	1	2020
JWA 18.1 Planning - Execution	3	2016	3	2018
NIE 18.2 Planning - Execution	2	2017	2	2019
JWA 19.1 Planning - Execution	3	2016	4	2019

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: February 2020	
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</i>		

Events	Start		End	
	Quarter	Year	Quarter	Year
NIE 19.2 Planning - Execution	2	2018	1	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army											Date: February 2020	
Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)					PE 0604802A / Weapons and Munitions - Eng Dev							
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	-	173.713	186.323	265.811	-	265.811	252.058	171.876	111.119	91.056	0.000	1,251.956
613: MORTAR SYSTEMS	-	0.000	5.792	1.409	-	1.409	0.000	0.000	0.000	7.993	0.000	15.194
BQ3: 155mm Artillery Propulsion XM654*	-	0.000	0.000	0.000	-	0.000	34.887	25.883	14.815	0.000	0.000	75.585
BY1: Next Generation Combat Vehicle Ammunition	-	0.000	0.000	23.017	-	23.017	14.986	8.792	5.995	0.000	0.000	52.790
EC4: Non-Standard Simulator Munitions	-	2.899	2.644	2.236	-	2.236	2.143	2.133	2.121	0.398	0.000	14.574
ED7: Advanced Multipurpose (AMP) Cartridge	-	20.814	14.100	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	34.914
EL9: Ammunitions Logistics Prototyping	-	1.684	2.329	1.701	-	1.701	0.704	0.999	1.019	1.039	0.000	9.475
EP2: Shoulder-Launched Munitions	-	0.000	4.100	10.390	-	10.390	0.000	0.000	0.000	0.000	0.000	14.490
EP3: Reduced Range Ammunition - Small Caliber	-	4.432	8.376	15.377	-	15.377	14.873	5.095	0.000	0.000	0.000	48.153
EP4: One-Way Luminescence for Small Caliber Ammo	-	5.855	8.547	13.977	-	13.977	6.981	7.393	2.998	0.000	0.000	45.751
EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	-	20.247	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	20.247
EP7: Aviation Airborne Expendable Countermeasures	-	0.000	4.920	4.476	-	4.476	8.241	0.000	0.000	0.000	0.000	17.637
EU4: 40mm HV Improved High Explosive Dual Purpose	-	6.937	13.055	8.351	-	8.351	2.311	0.000	0.000	0.000	0.000	30.654
EU5: .50 Caliber All-Purpose Tactical cartridge (APTC)	-	0.000	0.000	8.491	-	8.491	9.390	0.000	0.000	11.989	0.000	29.870
EU6: 155mm HE Rocket Assist Project Extended Range	-	37.565	18.943	31.236	-	31.236	2.997	2.997	0.000	0.000	0.000	93.738

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army										Date: February 2020			
Appropriation/Budget Activity					R-1 Program Element (Number/Name)								
2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)					PE 0604802A / Weapons and Munitions - Eng Dev								
EU7: Enhanced Lethality Cannon Munitions	-	10.915	7.908	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	18.823
EU8: Improved Multi-Option Fuze	-	7.615	10.000	7.992	-	7.992	4.995	0.000	0.000	0.000	0.000	0.000	30.602
EW1: 40mm Low Velocity Ammunition	-	8.467	14.032	22.479	-	22.479	5.958	1.998	0.000	0.000	0.000	0.000	52.934
FA6: 30mm Lethality	-	19.128	22.897	20.091	-	20.091	9.788	5.995	2.997	0.000	0.000	0.000	80.896
FJ4: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	0.000	0.000	27.600	-	27.600	82.685	72.655	64.440	54.453	0.000	0.000	301.833
FL4: Small Caliber Ammo for Next Gen Squad Weapons	-	0.000	18.180	30.600	-	30.600	28.723	24.976	11.739	11.858	0.000	0.000	126.076
S36: Precision Guidance Kit	-	27.155	30.500	33.365	-	33.365	22.396	12.960	4.995	3.326	0.000	0.000	134.697
XT2: 40mm Door Breach	-	0.000	0.000	3.023	-	3.023	0.000	0.000	0.000	0.000	0.000	0.000	3.023

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2021

Note

Project BY1 Next Generation Combat Vehicle Ammunition transitions from Budget Activity (BA) 4 Program Element (PE) 0603645A Armored System Modernization - Adv Dev Project EV7 Combat Vehicle Prototyping.
 Project ED7 Advanced Multipurpose (AMP) Cartridge transitions to Procurement.
 Project EU5 .50 Caliber All-Purpose Tactical Cartridge (APTC) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project EU3 .50 Caliber APTC.
 Project EU7 Enhanced Lethality Cannon Munitions transitions to Procurement.
 Project FJ4 Cannon-Delivered Area Effects Munitions (C-DAEM) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project FG1 C-DAEM.
 Project XT2 40 millimeter (mm) Door Breach (DB) is a new start in Fiscal Year (FY) 2021.

A. Mission Description and Budget Item Justification

PE 0604802A Weapons and Munitions - Eng Dev funds multiple efforts for the engineering development of weapons and munitions systems.

Project 613, Mortar Systems: This Project supports Mortar System & Fire Control Modernization (MS&FCM) activities. The Mortar System and Fire Control Modernization Project funds engineering development and demonstration of new technologies that will support modernized mortar weapon and mortar fire control systems. This includes capabilities that provide commonality between current and future weapon and fire control systems to help mitigate technology shortfalls and critical capability gaps. Future mortar systems that address these gaps include (but are not limited to) remote mortar turrets for mounted mortar systems, high-pressure capable cannons/components, and composite/lightweight components for dismounted systems. Mortar Fire Control Systems capabilities include lightweight inertial

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	
<p>measurement and navigation (IMU/INU) units for weapon pointing, simplified Ethernet/wireless-based digital communications interfaces, development of updated fire control software to enable commonality, integration with existing/future platform interfaces, and support for commercial off-the-shelf (COTS)/modified commercial off-the-shelf (MCOTS) fire control components. FY 2021 funding will support development and prototyping of new mortar weapon system and mortar fire control system technologies.</p> <p>Project BY1, Next Generation Combat Vehicle Ammunition: 50x228 millimeter (mm) family of ammunition is a critical technology development in response to the Next Generation Combat Vehicle (NGCV) Abbreviated Capability Development Document for weapon qualification, platform integration, and fielding of the Optionally Manned Fighting Vehicle primary weapon system (XM913). This effort includes the development of three capabilities: The XM1202 Target Practice with Trace; the XM1203 Armor Piercing Fin Stabilized Discarding Sabot with Trace; and the XM1204 High Explosive Airburst with Trace. The training cartridge will allow the Warfighter to train in a cost effective manner and the tactical cartridges will provide enhanced lethality at increased ranges when engaging personnel threats in the open, defilade, and under the cover of urban structures, Anti-Tank Guided Missiles (ATGM) teams, and current and projected future peer armored materiel threats. This effort is operating under Middle Tier Acquisition authority for rapid prototyping to qualify the three munitions in order to support the NGCV Cross Functional Team (CFT) timeline for First Unit Equipped (FUE). FY 2021 funding will support Engineering and Manufacturing Development (EMD) for all cartridges.</p> <p>Project EC4, Non-Standard Simulator Munitions: This Project will standardize various pyrotechnics that simulate battlefield effects. The Army's Combat Training Centers (CTCs) are currently using non-standard munitions to replicate both conventional and asymmetric warfare battlefield effects. These modified commercial-off-the-shelf products have not been type classified or material released and are not safe or sustainable for use by Soldiers. This effort will develop and demonstrate various pyrotechnics/ simulators to replicate both conventional and asymmetric warfare battlefield affects such as: Black smoke signature (burning vehicles, buildings, and equipment); Yellow smoke signature (chemical, biological or nuclear effects); Macro pyrotechnics to simulate hostile fire and small Improvised Explosive Devices (IEDs) during mounted operations in urban terrain; Micro pyrotechnics to simulate indoor hostile fire and IED effects that are capable of being integrated into existing facilities; Rocket Propelled Grenade (RPG) simulators to replicate the flight of a Rocket Propelled Grenade; High Order Blast Effect (HiOBE) used to replicate a Vehicle Borne Improvised Explosive Device (VBIED), building explosions, and other significant explosive events; Artillery airburst simulator to replicate indirect fire; simulator to replicate a STINGER firing; Tracer Fire-back simulator to replicate enemy small arms fire and anti-aircraft fire. Standardization will reduce training costs, eliminate redundancies between systems and mitigate environmental concerns and safety risks associated with realistic scenario based training. FY 2021 funding will support Engineering and Manufacturing Development (EMD) for Artillery Airburst and Stinger, Black Smoke, Yellow Smoke, and Micro/Macro pyrotechnics.</p> <p>Project ED7, Advanced Multipurpose (AMP) Cartridge: This Project supports the XM1147 Advanced Multi Purpose (AMP) program, a direct fire line of sight 120mm large caliber munition under development for the Abrams Main Battle Tank. AMP has three modes of operation including point detonate, point detonate delay, and airburst. AMP is the materiel solution for breaching double reinforced concrete walls and defeating ATGM teams from 50m to 2000m threshold and 50m to 4500m objective, a validated gap that cannot currently be met with existing stockpiled ammunition. In addition to added capability, AMP will also consolidate the capabilities of four existing stockpiled 120mm munitions, thereby addressing the users' battlecarry dilemma by allowing them to load a single munition that is capable of defeating multiple targets including ATGM teams, reinforced walls, personnel, light armor, bunkers, and obstacles. The full performance of the AMP is obtained with an Abrams equipped Ammunition Data Link breach modification, the same required by the 120mm M829A4 cartridge that achieved Milestone C in FY 2014 and achieved Full Materiel Release in FY 2015. There is no funding requested in FY 2021.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	
<p>Project EL9, Ammunition Logistics Prototyping: The Ammunition Logistics Prototyping Project supports the future force by improving the distribution, management, reliability and survivability of ammunition through the advanced development, integration, and demonstration of logistics system enablers. These enablers will improve the efficiency and effectiveness of ammunition operations, to include retrograde, while reducing the logistics footprint on the battlefield. Technology areas addressed include handling, distribution, and management (strategic and tactical), prognostics, diagnostics, and asset visibility, explosives safety, and adaptive and environmentally friendly packaging and palletization. The efficient deployment and sustainment of reliable ammunition is vital to success on the battlefield. This Project enhances the operational effectiveness of the ammunition logistics system to ensure the distribution of reliable ammunition to the warfighter. FY 2021 funding will be used to continue integrating the munitions health monitoring system with additional ammunition items, improve health monitoring survivability, and conduct qualification tests and continue to integrate passive time/temperature exposure sensors with additional ammunition items and conduct qualification testing.</p> <p>Project EP2, Shoulder-Launched Munitions: The Individual Assault Munition (IAM) will be a lightweight Shoulder Launched Munition (SLM) capability for combat units at the individual Soldier level. As an improvement over existing Shoulder Launched Munitions, the solution will fit within the Soldier Lethality Modernization Priority, by reducing Soldier load, while providing tactical innovation capable of extending overmatch against near-peer adversaries in a joint, multi-domain, high-intensity conflict. The IAM will allow Soldiers to conduct Urban Operations with an ability to defeat targets in an open space or in defilade at extended ranges. It will also allow Soldiers to defeat adversaries protected by field expedient structures and light armored vehicles. This solution will be effective day or night with the ability to safely engage targets from within enclosures using single hearing protection, increasing Soldier survivability. This solution will combine the capabilities of the existing Bunker Defeat Munition (BDM) and the AT4 Confined Space - Reduced Sensitivity (AT4CS-RS), which will allow for reduced Soldier load and training complexity, as well as reducing the logistics burden for Light Infantry, Combat Engineers, and Special Operations Forces. Fiscal Year (FY) 2021 funding will provide the Army the opportunity to evaluate various developmental munitions to achieve emerging increased capability as an Individual Assault Munition. The Individual Assault Munition Capabilities Development Document (CDD) was approved on 11 March 2016. FY 2021 funding will support the developmental shoulder-launched munition build and hardware testing to ensure the soldier has increased capabilities to engage targets at close and extended ranges, in the open, in defilade, behind field expedient structures.</p> <p>Project EP3, Reduced Range Ammunition - Small Caliber: The small caliber Reduced Range Ammunition (RRA) Project is a critical technology development in response to the 7.62 millimeter (mm) and .50 caliber Capabilities Development Documents (CDD). The overall objective of RRA is to provide training ammunition suitable for use on military installations with Surface Danger Zone (SDZ) restrictions. The relatively long maximum range of the 7.62mm and .50 caliber service ammunition poses challenges on training ranges in range restricted areas. RRA will mitigate a training gap on installations by providing a materiel solution that meets training needs while shortening and condensing the SDZ. This will allow soldiers to train with 7.62mm and .50 caliber weapons on restricted ranges. The RRA cartridge design will be compatible with all Army 7.62mm and .50 caliber weapons, but specifically optimized to work in the M240 and M2 Machine Guns. Fiscal Year (FY) 2021 funding supports continuing Engineering and Manufacturing Development (EMD) efforts, performing a Technical Readiness Review (TRR), conducting Production Qualification Testing (PQT), and performing activities to prepare for ammunition production transition to the Lake City Army Ammunition Plant (LCAAP) on the 7.62mm variant. FY 2021 also includes continuing the EMD effort, conducting a Critical Design Review (CDR), performing a User Evaluation / Soldier Touch Point (STP), and performing PQT on the 50 caliber variant. FY 2021 includes continuing activities to evaluate RRA ammunition prototypes and designs for the Next Generation Squad Weapon (NGSW) systems.</p> <p>Project EP4, One-Way Luminescence for Small Caliber Ammo: The One Way Luminescence (OWL) project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Families of Ammunition Capabilities Development Documents (CDD) and .50 Caliber Munitions CDD. Current small caliber ammunition</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>
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tracer rounds are a pyrotechnic tracer mix which allows enemy forces to see the trace round and track its trajectory back to the shooter. The OWL projects objective is to develop and field a full tracer round, replace the current pyrotechnic cartridges with trace cartridges that are only visible to the shooter and soldiers in close proximity, increasing soldier survivability, and increasing lethality by incorporating Enhanced Performance Round (EPR) technology into the new tracer ammunition. 7.62mm and 5.56mm are the immediate focus; later followed by .50 Caliber cartridges and Next Generation Squad Weapons (NGSW) ammunition. Fiscal Year (FY) 2021 funding will support continuing Engineering and Manufacturing Development (EMD) efforts, performing Production Qualification Testing (PQT), performing Safety Release Tests, conducting Live-Fire Testing and Evaluation (LFT&E), conducting a Critical Design Review (CDR), conducting a Limited User Evaluation (LUE), and performing preparation activities for manufacturing at the Lake City Army Ammunition Plant (LCAAP) for the 7.62mm variant. FY 2021 funding will also support EMD efforts, Design Verification Tests (DVT), and preparation for the Preliminary Design Review (PDR) for the 5.56mm variant. FY 2021 also supports concept development/evaluation of OWL tracer solutions for .50 Caliber weapons and NGSW.

Project EP5, Adv Armor-Piercing (ADVAP) for Small Caliber Ammo: This Project supports both the Advanced Armor-Piercing ammunition and the Next Generation Squad Weapon (NGSW) Family of Ammunition.

- Advanced Armor-Piercing (ADVAP): Advanced Armor-Piercing (ADVAP) project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Family of Ammunition Capabilities Development Documents (CDD). The nomenclature for the 7.62mm ADVAP is XM1158. The overall objective of the ADVAP project is to develop and Full Materiel Release (FMR) both 7.62mm XM1158 cartridge for the M240 machine gun and ADVAP ammunition in calibers below 7.62mm. The ADVAP ammunition in calibers below 7.62mm for the Next Generation Squad Weapons (NGSW) is referred to as the Special Purpose ammunition. The objective is to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges. There is no funding requested in FY 2021.

- Next Generation Squad Weapon (NGSW) Family of Ammunition: The NGSW ammo is a new ammunition technology under development for use in the Next Generation Squad Weapon systems. The objective is to develop and FMR the new ammunition. No funding requested in Fiscal Year (FY) 2021 on Army Program Element (PE) 0604802A / Project EP5.

Project EP7, Aviation Airborne Expendable Countermeasures (AAECM): will support Integrated System Design (ISD), System Capability (SC) and Manufacturing Process Demonstrations (MPD) on current pyrotechnic munitions and tunable pyrotechnic aircraft countermeasures and decoys to include the XM215 Flare and Radio Frequency (RF) expendables. These expendable countermeasures systems are an essential part of survivability equipment for Army aircraft. Army Research Development Technology & Evaluation (RDT&E) efforts are coordinated with Program Executive Office (PEO) Aviation to address the AAECM capability, a critical enabler for the Future Vertical Lift (FVL) - Aircraft Survivability Equipment (ASE) Cross Functional Team (CFT) within Army's Top modernization priorities.

These advanced decoys will address deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. The Project will also support ISD, SC and MPD on new expendable countermeasure munitions that will protect Army aircraft from advanced and current guided missile threats. Activities include modeling and simulation, flight testing, qualification testing, environmental considerations, safety enhancements, manufacturing enhancements, qualification of other service and foreign munitions that could meet current requirements, product improvements, insertion of new technologies to increase performance, and enhancement of current flare solutions for new and existing aircraft.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	
<p>Systems include impulse cartridges and aircraft expendables (to include RF expendables). FY 2021 will support continued modeling and simulation and developmental testing for RF countermeasures and verification testing for the XM215 design.</p> <p>Project EU4, 40mm High Velocity (HV) High Explosive Dual Purpose: This Project supports the 40mm High Velocity (HV) High Explosive Dual Purpose- Airburst (HEDP-AB), a new capability identified in the 40mm High Velocity Improved High Explosive Dual Purpose Cartridge CDD and will provide the Mk19 Mod 3 Grenade Machine Gun (GMG) an airburst capable cartridge with the ability of achieving required lethal effects against enemy targets in the open and in defilade while maintaining the capability to defeat unarmored and lightly armored vehicles. FY 2021 funding supports Option 1 award activities and EMD activities including Developmental Testing & Evaluation (DT&E), Limited User Evaluation (LUE), Family of Weapon Sights - Crew Served (FWS-CS) and Common Remote Operating Weapons System (CROWS) Integration.</p> <p>Project EU5, .50 Caliber All-Purpose Tactical cartridge (APTC): The APTC project is a critical technology development in response to the .50 caliber Munitions Capabilities Development Documents (CDD). The overall objective of All-Purpose Tactical Cartridge is to deliver Ball and Tracer ammunition that replaces and improves current legacy .50 caliber ammunition. The All-Purpose Tactical Cartridge will be compatible with all Army .50 caliber weapons but specifically optimized to work in the M2 Machine Guns. Fiscal Year (FY) 2021 funding supports Engineering and Manufacturing Development (EMD), Milestone B (MS-B) accomplishment, conducting Design Verification Tests (DVT), and performing Pre-Production Qualification Tests (PPQT).</p> <p>Project EU6, 155mm HE Rocket Assist Project Extended Range: The 155mm High Explosive (HE) Rocket Assisted Projectile, Extended Range Project supports the development of materiel solutions to meet the Army's long range precision fires modernization strategy. This Project supports projectile development efforts to achieve ranges of 40 kilometers (km) in current artillery weapon systems (39 caliber tube length) and characterize longer ranges in future artillery weapon systems (58 caliber tube length Extended Range Cannon Artillery, (ERCA). These efforts will leverage enhanced lethality cannon munition technologies to compensate for increased rocket motor volume. The projectile body will be filled with an insensitive munition (IM) HE and a supplementary charge to improve soldier survivability. FY 2021 funding supports the Urgent Materiel Release (UMR) activities of XM1113 including fire control software integration and development and qualification testing for current artillery systems. FY 2021 funding will also support the continuation of characterization activities required for a projectile concept compatible with the ERCA weapon systems to achieve the Army's requirement of extended range lethality with precision accuracy by FY 2023.</p> <p>Project EU7, Enhanced Lethality Cannon Munitions: The Enhanced Lethality Cannon Munitions (ELCM) Project will evaluate, develop, and qualify new lethality technologies for 155mm cannon artillery munitions and evaluate their effectiveness in mitigating evolving and derived capability gaps, and support transition to production. The ELCM Project supports testing and assessment of the Israeli Military Industries (IMI) Systems M999 advanced anti-personnel munition in support the Army Directed Requirement for a Rapid Bridging Solution for the replacement of the 155mm Dual Purpose Improved Conventional Munition (DPICM). This Project also accelerates the qualification of the 155mm XM1128 High Explosive Projectile, which will replace the M795 Critical Munition once qualified. Engineering efforts are ongoing and will support the evaluation of the XM1128 test data to determine that the Program is safe, suitable and operationally effective, as well as the gathering of all statutory and regulatory requirements in support of a Milestone C in FY 2021. In FY 2021, this Project does not have an Research Development Technology & Evaluation request.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	
<p>Project EU8, Improved Multi-Option Fuze: The Improved Multi-Option Fuze Project is a technology refresh and modernization effort that provides an incremental capability with technology advancements and performance improvements on the current non-precision artillery and mortar ammunition proximity multi-option fuze that will increase robustness to electronic countermeasures (ECM), eliminates the susceptibility of reverse engineering (RE), incorporates power source advancements, improves delay mode reliability, and integrates safe & arm improvements. This Project will develop and qualify safe, affordable, reliable, Proximity Height of Burst fuzing solutions with robust Defense Exportability Features (DEF) for non-precision conventional cannon artillery and mortar munitions that are resistant to adversary exploitation via ECM and RE threats. FY 2021 funding will support Improved Multi-Option Fuze Mortar (iMOFM) design verification, hardware fabrication, qualification testing, and Fuze Qualification Testing for both Multi-Option Fuze Artillery (MOFA) II and iMOFM.</p> <p>Project EW1, 40mm Low Velocity Ammunition: The 40mm Low Velocity High Explosive Air Burst (HEAB) is a new capability identified as a Warfighter requirement in the CDD, 40mm Low Velocity (LV) Family of Ammunition Annex. The 40mm Low Velocity HEAB tactical cartridge allows the warfighter to engage targets at increased effective ranges using the 40mm M320 Grenade Launcher. The HEAB cartridge provides the grenadier with a higher probability of achieving a first shot kill against enemy personnel, coupled with the ability to defeat personnel targets in defilade positions. When deployed against point and area targets, the cartridge inflicts incapacitating effects against personnel beyond those offered by the current M433 High Explosive Dual Purpose (HEDP) cartridge. The cartridge provides lethal effects against targets with improved accuracy and greater standoff ranges increasing Soldier Survivability. FY 2021 will support any remaining DET 3 build, Design Engineering Test (3), Developmental Test and Evaluation (DT&E) build and test, and Soldier Touch Point (Limited User Evaluation), Critical Design Review, Test Readiness Reviews (TRRs) and Milestone (MS) C preparations.</p> <p>Project FA6, 30mm Lethality: This Project funds the development of a suite of 30x173mm caliber cartridges, which includes a HEAB cartridge XM1182 for increased anti-personnel effects, an Armor Piercing (AP) cartridge XM1170 for anti-material, and target practice cartridges XM1172 & XM1173 that are ballistically matched to the tactical cartridges. A non-developmental airburst munition will be Urgent Materiel Released (UMR) as an interim solution prior to HEAB. The objective is to enhance the operational effectiveness and lethality of the Stryker Infantry Carrier Vehicle (ICV), Next Generation Combat Vehicle (NGCV), and any Army Fighting Vehicles that are equipped with a 30x173mm weapon system. The tactical AP cartridge will provide an organic direct fire capability to support infantry at a greater range and will improve lethality when engaging light-to-medium armored vehicles. The HEAB cartridge will provide the Warfighter with increased lethality against troops in the open, counter defilade, ATGM teams, and troops in urban structures. The training cartridges will be ballistically matched to the tactical cartridges, allowing the Warfighter to train in a cost effective manner. This Project will leverage earlier efforts in support of the Stryker Operational Needs Statement (ONS) for Increased Lethality for the 2nd Calvary Regiment (2CR), United States Army Europe (USAREUR) (HQDA ONS 15-20590). FY 2021 funding will support Design Engineering Testing and Developmental Test & Evaluation (DT&E) prototype development .</p> <p>Project FJ4, Cannon-Deliverd Area Effects Munitions (C-DAEM): The C-DAEM Project will provide United States (U.S.) ground forces with the capability to engage area personnel through armored targets, while denying threat forces full operational freedom within the targeted area. An Analysis of Alternatives (AoA) was completed in January 2018 to inform Army acquisition and investment decisions regarding replacement of the current stockpile of 155mm Dual Purpose Improved Conventional Munitions (DPICM) with Department of Defense (DoD) policy compliant munitions and address anti-armor and extended range capability requirements. The Army validated two materiel solutions for C-DAEM to be pursued in parallel. C-DAEM Armor (Increment 1) will destroy moved and moving infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM DPICM Replacement (Increment 2) will destroy personnel to light-skinned vehicles. FY 2020 funding will support qualification</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	
<p>of C-DAEM DPICM Replacement solution(s) for safety, performance, and DoD policy compliance verification testing to support the Army's modernization priorities in support of the National Defense Strategy.</p> <p>Project FL4, Small Caliber Ammo for Next Gen Squad Weapons: The Small Caliber Ammo for Next Gen Squad Weapons project is a critical technology development in response to the Soldier Lethality Cross Functional Team (SL CFT) Initial Capability Document (ICD) for the ammunition required to support the rapid prototyping, development, and fielding of the Next Generation Squad Weapons (NGSW) under the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding. The objective is to develop and Full Materiel Release (FMR) the new ammunition in parallel with the NGSW rifle and automatic rifle. The NGSW ammunition is split into two initial projectile variants, the General Purpose (GP) and the Special Purpose (SP). Fiscal Year (FY) 2021 funding supports continuing rapid prototyping/development of the GP projectile, building prototypes and delivering prototypes to the weapon system contractors for integration into the weapon system development, conducting prototype testing and engineering testing. FY 2021 also supports continuing rapid prototyping for the SP projectile, conducting a Critical Design Review (CDR), conducting prototype testing and engineering testing. FY 2021 supports development of prototype solutions for the Reduced Range Ammunition (RRA) variant; to include building and evaluating RRA concepts/designs, and conducting a Preliminary Design Review (PDR). FY 2021 also includes development efforts to evaluate competing concepts/solutions for the tracer ammunition variant required for the NGSW; including maturing/refining tracer ammunition designs and performing engineering tests. FY 2021 supports initial activities to evaluate potential solutions/prototypes and concepts to satisfy follow-on NGSW ammunition requirements. Follow-on NGSW ammunition types includes: Blank and Close Combat Mission Capability Kit (CCMCK) training ammunition. Development efforts on the follow-on NGSW ammunition variants will continue into FY 2022. This is a priority of the Secretary's Close Combat Lethality Task Force. Funding for this project aligns with the Army's priorities in support of the National Defense Strategy.</p> <p>Project S36, Precision Guidance Kit: The Precision Guidance Kit (PGK) M1156 is a course correcting fuze that provides precision accuracy and efficiency for current and future 155mm High Explosive (HE) projectiles by eliminating a portion of the inherent errors associated with ballistic firing solutions, which effectively reduces the number of projectiles required to execute fire missions. PGK utilizes a Global Positioning System (GPS) receiver and internal Guidance and Navigation Computer to accomplish its mission with point detonating and height of burst fuzing functions. The PGK M1156E1 development effort, Long Range-PGK (LR-PGK), will qualify state of the art technologies for operation in GPS degraded environments and compatibility with Army Modernization objectives under the Long Range Precision Fires (LRPF) CFT's new long range cannon, ERCA. The ERCA and its new long range projectiles require the LR-PGK to meet requirements, and will be fielded during the PGK Life Cycle. LR-PGK supports the Army's modernization priorities in support of the National Defense Strategy and future 155mm projectiles and M777 Long Range Cannon (LRC) initiatives. FY 2021 funding supports the award of a follow-on EMD contract for system design and prototype development for LR-PGK.</p> <p>Project XT2, 40mm Door Breach: The 40mm Low Velocity (LV) Door Breach (DB), XM1167, cartridge allows the grenadier to conduct a ballistic breach of an existing door to create an entry point into a building or other structure. This capability is critical during Urban Operations, while having stand-off ability to conduct ballistic breach at ranges up to 50 meters away, with a single-shot, and without pause between actual breach and entry of initial force. The 40mm Door Breach cartridge will provide the small unit with the capability to conduct efficient breaching operations; allowing the Warfighter to create an entry point into a structure for an assault element to enter and begin clearing operations, one of the most difficult types of operations that Soldiers may face in an urban environment. The 40mm Door Breach cartridge will reduce collateral damage and friendly casualties associated with breaching operations. The deployment of 40mm Door Breach cartridges will enable the small unit to gain and maintain a tactical advantage through efficiency of combat power and momentum. FY 2021 will consist of Developmental Testing and Evaluation (DT&E) for the purpose of qualifying the Door Breach cartridge design.</p>		

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	172.744	181.023	134.960	-	134.960
Current President's Budget	173.713	186.323	265.811	-	265.811
Total Adjustments	0.969	5.300	130.851	-	130.851
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-4.700			
• Congressional Rescissions	-	-			
• Congressional Adds	-	10.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.969	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	130.851	-	130.851

Change Summary Explanation

Project BY1 Next Generation Combat Vehicle Ammunition transitions from BA 4 PE 0603645A Armored System Modernization - Adv Dev Project EV7 Combat Vehicle Prototyping.

Project ED7 Advanced Multipurpose (AMP) Cartridge transitions to Procurement.

Project EU5 .50 Caliber All-Purpose Tactical Cartridge (APTC) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project EU3 .50 Caliber APTC.

Project EU7 Enhanced Lethality Cannon Munitions transitions to Procurement.

Project FJ4 Cannon-Delivered Area Effects Munitions (C-DAEM) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project FG1 C-DAEM.

Project XT2 40 millimeter (mm) Door Breach (DB) is a new start in FY 2021.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) 613 / MORTAR SYSTEMS
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
613: MORTAR SYSTEMS	-	0.000	5.792	1.409	-	1.409	0.000	0.000	0.000	7.993	0.000	15.194
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Mortar System and Fire Control Modernization Project funds engineering development and demonstration of new technologies that will support modernized mortar weapon and mortar fire control systems. This includes capabilities that provide commonality between current and future weapon and fire control systems to help mitigate technology shortfalls and critical capability gaps. Future mortar systems that address these gaps include (but are not limited to) remote mortar turrets for mounted mortar systems, high-pressure capable cannons/components, and composite/lightweight components for dismounted systems. Mortar Fire Control Systems capabilities include lightweight inertial measurement and navigation (IMU/INU) units for weapon pointing, simplified Ethernet/wireless-based digital communications interfaces, development of updated fire control software to enable commonality, integration with existing/future platform interfaces, and support for commercial off-the-shelf (COTS)/modified commercial off-the-shelf (MCOTS) fire control components. Fiscal Year (FY) 2021 funding will support development and prototyping of new mortar weapon system and mortar fire control system technologies.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Mortar System & Fire Control Modernization	-	5.529	1.409	-	1.409
Description: Mortar Systems and Fire Control Modernization initiatives include development and demonstration of new technologies to validate production potential for future mortar systems; including remote turrets and new weapon system components, modernized lightweight pointing device, updated Line Replaceable Units (LRUs), streamlined digital communications, and updated mortar fire control software.					
FY 2020 Plans: FY 2020 funds supported engineering initiatives and prototyping of fire control LRU and software.					
FY 2021 Base Plans: FY 2021 funds will continue the support development and prototyping of new mortar weapon system and mortar fire control system technologies.					
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 decrease funding supports current Mortar System and Fire Control Modernization efforts in engineering development and demonstration of new technologies for modernized Mortar System and Fire Control systems.					
Title: FY 2020 SBIR/STTR Transfer	-	0.263	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) 613 / MORTAR SYSTEMS

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	-	5.792	1.409	-	1.409

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
• AD9300: Mortar Fire Control Systems Modifications	-	10.000	7.292	-	7.292	4.196	8.091	6.494	-	0.000	36.073
• K99200: Computer Ballistics: LHMBBC XM32	9.513	3.838	7.509	0.280	7.789	7.241	7.235	7.239	9.405	0.000	52.260
• K99300: Mortar Fire Control System	29.149	29.174	3.800	13.672	17.472	4.186	5.783	8.063	3.797	0.000	97.624
• G02200: Mortar Systems	24.312	33.026	10.288	10.460	20.748	11.678	11.558	10.018	16.791	Continuing	Continuing
• G02100: Mortar Modification	3.965	1.693	1.689	-	1.689	1.689	1.690	1.690	-	0.000	12.416

Remarks
Other Procurement, Army (OPA) Funding / Procurement of Weapons & Tracked Combat Vehicle (W&TCV)

D. Acquisition Strategy
The Mortar System and Fire Control Modernization strategy is using the Department of Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiatives for hardware and software development during Engineering Manufacturing Design Phase. A new Federal Acquisition Regulation (FAR) based contract will be awarded to complete full rate production.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) 613 / MORTAR SYSTEMS
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Mortar System & Fire Control Modernization - Project Manager Office Support	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	0.178	-		0.012	Nov 2019	0.050	Nov 2020	-		0.050	0.000	0.240	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.263		-		-		-	0.000	0.263	-
Subtotal			0.178	-		0.275		0.050		-		0.050	0.000	0.503	N/A

Remarks
Program management includes travel and documentation support.

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Mortar System & Fire Control Modernization - Fire Control Common Pointing	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : TBD	-	-		1.252	Jun 2020	1.234	Mar 2021	-		1.234	0.000	2.486	-
Mortar System & Fire Control Modernization - Turreted Mortar FCT Compatibility	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : TBD	-	-		0.462	Aug 2020	-		-		-	0.000	0.462	-
Mortar System & Fire Control Modernization - Fire Control Common Pointing	MIPR	DoD Ordnance Technology Consortium (DOTC) - Inertial Labs : Paeonian Springs, VA	2.194	-		0.962	Jun 2020	-		-		-	0.000	3.156	-
Subtotal			2.194	-		2.676		1.234		-		1.234	0.000	6.104	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) 613 / <i>MORTAR SYSTEMS</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
Mortar System and Fire Control Modernization (MS&FCM)																												
MS&FCM- Engineering & Manufacturing Development (EMD)																												
MS&FCM - LRU Software Development																												
MS&FCM- System Architecture Development (Sys Eng Phase 1)																												
MS&FCM- Preliminary Design Review (PDR)																												
MS&FCM- EMD Detailed Design Testing (Sys Eng Phase 2)																												
MS&FCM- Critical Design Review (CDR)																												
MS&FCM-Fire Control Software Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) 613 / <i>MORTAR SYSTEMS</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Mortar System and Fire Control Modernization (MS&FCM)	1	2020	1	2020
MS&FCM- Engineering & Manufacturing Development (EMD)	1	2020	4	2021
MS&FCM - LRU Software Development	1	2020	4	2021
MS&FCM- System Architecture Development (Sys Eng Phase 1)	1	2020	1	2021
MS&FCM- Preliminary Design Review (PDR)	1	2021	1	2021
MS&FCM- EMD Detailed Design Testing (Sys Eng Phase 2)	2	2021	4	2021
MS&FCM- Critical Design Review (CDR)	4	2021	4	2021
MS&FCM-Fire Control Software Development	1	2025	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) BY1 / Next Generation Combat Vehicle Ammunition			
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
BY1: Next Generation Combat Vehicle Ammunition	-	0.000	0.000	23.017	-	23.017	14.986	8.792	5.995	0.000	0.000	52.790
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project BY1 Next Generation Combat Vehicle Ammunition transitions from Budget Activity (BA) 4 Program Element (PE) 0603645A Armored System Modernization - Adv Dev Project EV7 Combat Vehicle Prototyping in Fiscal Year (FY) 2021.

A. Mission Description and Budget Item Justification

50x228 millimeter (mm) family of ammunition is a critical technology development in response to the Next Generation Combat Vehicle (NGCV) Abbreviated Capability Development Document for weapon qualification, platform integration, and fielding of the Optionally Manned Fighting Vehicle primary weapon system (XM913). This effort includes the development of three capabilities: The XM1202 Target Practice with Trace; the XM1203 Armor Piercing Fin Stabilized Discarding Sabot with Trace; and the XM1204 High Explosive Airburst with Trace. The training cartridge will allow the Warfighter to train in a cost effective manner and the tactical cartridges will provide enhanced lethality at increased ranges when engaging personnel threats in the open, defilade, and under the cover of urban structures, Anti-Tank Guided Missiles (ATGM) teams, and current and projected future peer armored materiel threats. This effort is operating under Middle Tier Acquisition authority for rapid prototyping to qualify the three munitions in order to support the NGCV Cross Functional Team (CFT) timeline for First Unit Equipped (FUE). FY 2021 funding will support Engineering and Manufacturing Development (EMD) for all cartridges.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: 50x228mm Ammunition Development	-	-	23.017	-	23.017
Description: Qualify 50mm Target Practice with Trace (TP-T), Armour-Piercing Fin-Stabilized Discarding Sabot with Trace (APFSDS-T), and High Explosive Airburst with Trace (HEAB-T) ammunition through the rapid prototyping phase.					
FY 2021 Base Plans: Funding will be used to support the continued development of TP-T, APFSDS-T, and HEAB-T ammunition. In addition, the funding will also be used to support Displaced Equipment Training (DET) and hardware build for Developmental Test & Evaluation (DT&E) for each of the three 50mm cartridges.					
FY 2020 to FY 2021 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) BY1 / Next Generation Combat Vehicle Ammunition

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Project BY1 Next Generation Combat Vehicle Ammunition transitions from BA 4 PE 0603645A Armored System Modernization - Adv Dev Project EV7 Combat Vehicle Prototyping.					
Accomplishments/Planned Programs Subtotals	-	-	23.017	-	23.017

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>
• E07610: CTG, 30MM, Progrmabl Air Burst Mun, Mk310, Linked	1.765	13.412	14.550	-	14.550	30.478	53.444	154.048	154.347	0.000	422.044

Remarks
Funding for production to start in FY 2023 for NGCV Ammunition. The funding, in part, currently residing on the 30MM Mk310 BLIN E07610 will be re-aligned to a new 50MM Next Generation Combat Vehicle Ammunition Budget Line (E80011) prior to President's Budget (PB) 2022 submission.

D. Acquisition Strategy
Department of Defense Ordnance and Technology Consortium (DOTC) OTA will be used to support the rapid prototyping efforts for the 50 x 228mm TP-T, APFSDS-T, and HEAB-T cartridges. These efforts will consist of EMD, which includes DET, technical reviews, and Developmental Test and Evaluation (DT&E). The DOTC contracts will conclude upon successfully performing qualification testing DT&E scheduled for FY 2022 for the Target Practice with Trace (TP-T), FY 2023 for the APFSDS-T and FY 2024 for the HEAB-T cartridges. Low Rate Initial Production (LRIP) will be competed in follow-on production contracts.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) BY1 / Next Generation Combat Vehicle Ammunition
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
50x228mm APFSDS-T Ammunition Development & Test Evaluation Hardware Contract	C/CPFF	TBS : TBS	-	-		-		2.000	Mar 2021	-		2.000	0.000	2.000	-
50x228mm TP-T Ammunition Development & Test Evaluation Hardware Contract	C/CPFF	TBS : TBS	-	-		-		2.000	Mar 2021	-		2.000	0.000	2.000	-
50x228mm HEAB-T Ammunition Design Engineering Test Hardware Contract	C/CPFF	TBS : TBS	-	-		-		11.978	Mar 2021	-		11.978	0.000	11.978	-
Subtotal			-	-		-		15.978		-		15.978	0.000	15.978	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
50x228mm Ammo Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny, NJ	-	-		-		3.339	Dec 2020	-		3.339	0.000	3.339	-
Subtotal			-	-		-		3.339		-		3.339	0.000	3.339	N/A

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			
50x228mm Design Engineering Testing	MIPR	Aberdeen Proving Ground (APG) : Aberdeen, MD	-	-		-		3.700	Jan 2021	-		3.700	0.000	3.700	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) BY1 / Next Generation Combat Vehicle Ammunition

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	
50mm TP-T & APFSDS-T EMD Award					▲ 1																								
50mm TP-T & APFSDS-T EMD																													
50mm TP-T & APFSDS-T Design Engineering Test Build																													
50mm TP-T & APFSDS-T Design Engineering Testing																													
50mm TP-T & APFSDS-T Critical Design Review (CDR)																													
50mm TP-T & APFSDS-T Development Test & Evaluation Build																													
50mm TP-T & APFSDS-T Development Test & Evaluation																													
50mm TP-T & APFSDS-T Milestone C																													
50mm TP-T & APFSDS-T Production Contract Award																													
50mm TP-T & APFSDS-T Low Rate Initial Production (LRIP)																													
50mm TP-T & APFSDS-T Type Classification-Standard																													
50mm TP-T & APFSDS-T Full Rate Production (FRP)																													
50mm HEAB-T EMD Award																													

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) BY1 / Next Generation Combat Vehicle Ammunition

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
50mm HEAB-T EMD																												
50mm HEAB-T Design Engineering Testing 1 Build																												
50mm HEAB-T Design Engineering Testing 1																												
50mm HEAB-T Design Engineering Testing 2 Build																												
50mm HEAB-T Design Engineering Testing 2																												
50mm HEAB-T Critical Design Review (CDR)																												
50mm HEAB-T Development Test & Evaluation Build																												
50mm HEAB-T Development Test & Evaluation																												
50mm HEAB-T Milestone C																												
50mm HEAB-T Production Contract Award																												
50mm HEAB-T Low Rate Initial Production (LRIP)																												
50mm HEAB-T Type Classification- Standard (TC-STD)																												
50mm HEAB-T Full Rate Production (FRP)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) BY1 / <i>Next Generation Combat Vehicle Ammunition</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
50mm TP-T & APFSDS-T EMD Award	2	2020	2	2020
50mm TP-T & APFSDS-T EMD	2	2020	3	2023
50mm TP-T & APFSDS-T Design Engineering Test Build	4	2020	2	2021
50mm TP-T & APFSDS-T Design Engineering Testing	2	2021	3	2021
50mm TP-T & APFSDS-T Critical Design Review (CDR)	4	2021	4	2021
50mm TP-T & APFSDS-T Development Test & Evaluation Build	4	2021	2	2022
50mm TP-T & APFSDS-T Development Test & Evaluation	3	2022	1	2024
50mm TP-T & APFSDS-T Milestone C	3	2023	3	2023
50mm TP-T & APFSDS-T Production Contract Award	3	2023	3	2023
50mm TP-T & APFSDS-T Low Rate Initial Production (LRIP)	3	2023	4	2024
50mm TP-T & APFSDS-T Type Classification-Standard	4	2024	4	2024
50mm TP-T & APFSDS-T Full Rate Production (FRP)	4	2024	4	2027
50mm HEAB-T EMD Award	2	2020	2	2020
50mm HEAB-T EMD	2	2020	2	2024
50mm HEAB-T Design Engineering Testing 1 Build	2	2020	4	2020
50mm HEAB-T Design Engineering Testing 1	1	2021	2	2021
50mm HEAB-T Design Engineering Testing 2 Build	3	2021	1	2022
50mm HEAB-T Design Engineering Testing 2	2	2022	3	2022
50mm HEAB-T Critical Design Review (CDR)	4	2022	4	2022
50mm HEAB-T Development Test & Evaluation Build	1	2023	3	2023
50mm HEAB-T Development Test & Evaluation	4	2023	1	2024
50mm HEAB-T Milestone C	2	2024	2	2024

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) BY1 / Next Generation Combat Vehicle Ammunition
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Events	Start		End	
	Quarter	Year	Quarter	Year
50mm HEAB-T Production Contract Award	3	2024	3	2024
50mm HEAB-T Low Rate Initial Production (LRIP)	3	2024	3	2025
50mm HEAB-T Type Classification- Standard (TC-STD)	3	2025	3	2025
50mm HEAB-T Full Rate Production (FRP)	3	2025	3	2027

Note
 Notes:
 Target Practice with Trace (TP-T)
 Armour-Piercing Fin-Stabilized Discarding Sabot with Trace (APFSDS-T)
 High Explosive Airburst with trace (HEAB-T)

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EC4 / Non-Standard Simulator Munitions			
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
EC4: Non-Standard Simulator Munitions	-	2.899	2.644	2.236	-	2.236	2.143	2.133	2.121	0.398	0.000	14.574
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project EC4 Non-Standard Simulator Munitions will standardize various pyrotechnics that simulate battlefield effects. The Army's Combat Training Centers (CTCs) are currently using non-standard munitions to replicate both conventional and asymmetric warfare battlefield effects. These modified commercial-off-the-shelf products have not been type classified or material released and are not safe or sustainable for use by Soldiers. This effort will develop and demonstrate various pyrotechnics/simulators to replicate both conventional and asymmetric warfare battlefield effects such as: Black smoke signature (burning vehicles, buildings, and equipment); Yellow smoke signature (chemical, biological or nuclear effects); Macro pyrotechnics to simulate hostile fire and small Improvised Explosive Devices (IEDs) during mounted operations in urban terrain; Micro pyrotechnics to simulate indoor hostile fire and IED effects that are capable of being integrated into existing facilities; Rocket Propelled Grenade (RPG) simulators to replicate the flight of a Rocket Propelled Grenade; High Order Blast Effect (HiOBE) used to replicate a Vehicle Borne Improvised Explosive Device (VBIED), building explosions, and other significant explosive events; Artillery airburst simulator to replicate indirect fire; simulator to replicate a STINGER firing; Tracer Fire-back simulator to replicate enemy small arms fire and anti-aircraft fire. Standardization will reduce training costs, eliminate redundancies between systems and mitigate environmental concerns and safety risks associated with realistic scenario based training.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Standardize of Special Use Ammunition	2.899	2.524	2.236	-	2.236
Description: Standardize non-standard pyrotechnic battlefield effects currently used by CTCs.					
FY 2020 Plans: This project supported the Engineering and Manufacturing Development (EMD) phases for Artillery Airburst, Stinger, Black Smoke and Yellow Smoke to include Energetic Material Qualification (EMQ) testing. Evaluated the following Commercial Off the Shelf (COTS) items for environmental and safety considerations: Macro/Micro, RPG on a wire, HiOBE and Tracer-Fire back.					
FY 2021 Base Plans: This project will continue to support the EMD phase for Artillery Airburst and Stinger, Black Smoke, Yellow Smoke, and Micro/Macro pyrotechnics.					
FY 2020 to FY 2021 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Change in funding from FY 2020 to FY 2021 due to entry into the EMD phase of select efforts within the overall program.					
Title: FY 2020 SBIR/STTR Transfer	-	0.120	-	-	-
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	2.899	2.644	2.236	-	2.236

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>
• E88404: SIMULATORS, Non-Standard, Special Effects, f/CTCs	-	1.699	1.748	-	1.748	0.282	0.289	0.289	0.289	0.000	4.596

Remarks

D. Acquisition Strategy
 The Acquisition strategy is to incrementally develop and field a family of special use ammunition. Milestone Decision Document (MDD) approval 1st Quarter FY 2020. Initial special use ammunition to be fielded will be the black smoke simulator followed by additional training simulators as required in the Future Army System of Integrated Targets (FASIT) Capability Production Document (CPD).

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EC4 / Non-Standard Simulator Munitions							
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	-	-		0.120		-		-		-	0.000	0.120	-
Subtotal			-	-		0.120		-		-		-	0.000	0.120	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
Product Development	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	1.134	1.386	May 2019	0.760	May 2020	0.600	Oct 2020	-		0.600	0.000	3.880	-
Subtotal			1.134	1.386		0.760		0.600		-		0.600	0.000	3.880	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
Engineering Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	1.665	0.600	Feb 2019	1.123	Jan 2020	1.156	Oct 2020	-		1.156	0.000	4.544	-
Subtotal			1.665	0.600		1.123		1.156		-		1.156	0.000	4.544	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	CCDC Armaments Center : Picatinny Arsenal, NJ	0.541	0.913	Jun 2019	0.641	Jun 2020	0.480	Jun 2021	-		0.480	0.000	2.575	-
Subtotal			0.541	0.913		0.641		0.480		-		0.480	0.000	2.575	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army								Date: February 2020					
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EC4 / Non-Standard Simulator Munitions					
	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3.340	2.899		2.644		2.236		-		2.236	0.000	11.119	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions

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	
Yellow Smoke Milestone C													▲ 11 Yellow Smoke MS-C																
Yellow Smoke Production																													
Micro/Macro																													
Micro/Macro Milestone B					▲ 8 Micro/Macro MS-B																								
Micro/Macro Engineering Manufacturing and Development																													
Micro/Macro Milestone C																	▲ 18 Micro/Macro MS-C												
Micro/Macro Production																													
RPG																													
RPG Milestone B													▲ 13 RPG MS-B																
RPG Engineering Manufacturing and Development																													
RPG Milestone C																													
RPG Production																													
HIOBE																													

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions

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					
HiOBE Milestone B													15 HiOBE MS-B																				
HiOBE Engineering Manufacturing and Development																																	
HiOBE Milestone C																					21 HiOBE MS-C												
HiOBE Production																									HiOBE Product								
Tracer																																	
Tracer Milestone B													17 Tracer MS-B																				
Tracer Engineering Manufacturing and Development																									Tracer EMD								
Tracer Milestone C																									20 Tracer MS-C								
Tracer Production																													Tracer Production				

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Artillery Airburst and Stinger	3	2020	3	2020
Artillery Airburst and Stinger Milestone B	3	2020	3	2020
Artillery Airburst and Stinger Engineering Manufacturing and Development	3	2020	4	2021
Artillery and Stinger MS C	4	2021	4	2021
Artillery and Stinger Production	4	2021	4	2028
Black Smoke	3	2020	3	2020
Black Smoke Milestone B	3	2020	3	2020
Black Smoke Engineering Manufacturing and Development	3	2020	2	2021
Black Smoke Milestone C	2	2021	2	2021
Black Smoke Production	2	2021	4	2026
Yellow Smoke	4	2020	4	2020
Yellow Smoke Milestone B	4	2020	4	2020
Yellow Smoke Engineering Manufacturing and Development	4	2020	1	2022
Yellow Smoke Milestone C	1	2022	1	2022
Yellow Smoke Production	2	2022	4	2025
Micro/Macro	4	2020	4	2020
Micro/Macro Milestone B	4	2020	4	2020
Micro/Macro Engineering Manufacturing and Development	4	2020	1	2023
Micro/Macro Milestone C	1	2023	1	2023
Micro/Macro Production	2	2023	1	2032
RPG	3	2022	3	2022
RPG Milestone B	3	2022	3	2022

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions
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Events	Start		End	
	Quarter	Year	Quarter	Year
RPG Engineering Manufacturing and Development	3	2022	4	2024
RPG Milestone C	4	2024	4	2024
RPG Production	1	2025	1	2030
HiOBE	4	2022	4	2022
HiOBE Milestone B	4	2022	4	2022
HiOBE Engineering Manufacturing and Development	4	2022	2	2025
HiOBE Milestone C	2	2025	2	2025
HiOBE Production	2	2025	1	2029
Tracer	1	2023	1	2023
Tracer Milestone B	1	2023	1	2023
Tracer Engineering Manufacturing and Development	1	2023	2	2025
Tracer Milestone C	2	2025	2	2025
Tracer Production	2	2025	3	2029

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge			
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
ED7: Advanced Multipurpose (AMP) Cartridge	-	20.814	14.100	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	34.914
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project ED7 Advanced Multipurpose (AMP) Cartridge transitions to Procurement.

A. Mission Description and Budget Item Justification

The XM1147 Advanced Multi Purpose (AMP) program is a direct fire line of sight 120 millimeter (mm) large caliber munition under development for the Abrams Main Battle Tank. AMP has three modes of operation including point detonate, point detonate delay, and airburst. AMP is the materiel solution for breaching double reinforced concrete walls and defeating Anti Tank Guided Missile (ATGM) teams from 50 Meter (m) to 2000m threshold and 50m to 4500m objective, a validated gap that cannot currently be met with existing stockpiled ammunition. In addition to added capability, AMP will also consolidate the capabilities of four existing stockpiled 120mm munitions, thereby addressing the users' battlecarry dilemma by allowing them to load a single munition that is capable of defeating multiple targets including ATGM teams, reinforced walls, personnel, light armor, bunkers, and obstacles. The full performance of the AMP is obtained with an Abrams equipped Ammunition Data Link breach modification, the same required by the 120mm M829A4 cartridge that achieved Milestone C in Fiscal Year (FY) 2014 and achieved Full Materiel Release in FY 2015. In FY 2021 there is no funding request.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Engineering and Manufacturing Development (EMD) Phase 2	20.064	13.460	-	-	-
Description: Design, develop and test components and cartridges leading to a design freeze. The final design will then be carried forward to Developmental Test and Evaluation (DT&E) qualification testing to demonstrate the cartridge's ability to meet performance requirements prior to production.					
FY 2020 Plans: Engineering Manufacturing Development Phase 2 continued with the initiation and completion of DT&E build which included Limited User and Live Fire Testing, Initial Operation Test Planning, preparation for transition to Low Rate Initial Production at Milestone C, and Milestone C approval.					
FY 2020 to FY 2021 Increase/Decrease Statement: Project ED7 Advanced Multipurpose (AMP) Cartridge transitions to Procurement.					
Title: Evaluation for Future Combat Platforms	0.250	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: Evaluation of the scalability for future combat platforms.					
Title: Training Round Demonstration	0.500	-	-	-	-
Description: Demonstrate feasibility of a training round for AMP					
Title: FY 2020 SBIR/STTR Transfer	-	0.640	-	-	-
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	20.814	14.100	-	-	-

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>
• E88105: CTG, 120MM TANK, HEMP-T, XM1147	16.398	10.000	38.989	-	38.989	46.893	46.902	44.463	29.970	0.000	233.615

Remarks

D. Acquisition Strategy
The XM1147 AMP Program achieved Milestone B and entered EMD in FY 2015. EMD consists of two phases; Phase 1 awarded two contracts in FY 2015 to competitively prototype. A cartridge demonstration test was conducted and was used to support down-select to a single contractor for EMD Phase 2, which will lead to Milestone C in 2020 followed by two Low Rate Initial Productions in FY 2020 and FY 2021 and one optional year of full procurement in FY 2022. Explore options to increase future competition and facilitate effective training.

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				ED7 / Advanced Multipurpose (AMP) Cartridge							
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	-	-		0.640		-		-		-	0.000	0.640	-
Subtotal			-	-		0.640		-		-		-	0.000	0.640	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
Project Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : NJ	5.047	0.889	Dec 2018	0.298	Dec 2019	-		-		-	Continuing	Continuing	Continuing
Engineering Manufacturing & Development Contract	C/CPIF	Northrop Grumman Innovation Systems (NGIS) : Plymouth, MN	76.992	9.519	Feb 2019	3.237	Nov 2019	-		-		-	Continuing	Continuing	Continuing
Subtotal			82.039	10.408		3.535		-		-		-	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
Engineering Support	MIPR	Combat Capabilities Development Command - Armaments Center (CCDC-AC) : Picatinny, NJ	9.943	2.578	Oct 2018	1.437	Nov 2019	-		-		-	Continuing	Continuing	Continuing
Subtotal			9.943	2.578		1.437		-		-		-	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge

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 and Manufacturing Development (EMD) Phase II	[Blue bar spanning FY 2019 Q1-Q4, FY 2020 Q1-Q4]																											
Critical Design Review	[Blue bar spanning FY 2019 Q4, FY 2020 Q1]																											
Developmental Test and Evaluation (DT&E)	[Blue bar spanning FY 2020 Q2-Q4]																											
Milestone C	[Blue bar spanning FY 2020 Q4, FY 2021 Q1]																											
Low Rate Initial Production 1	[Blue bar spanning FY 2021 Q1-Q4]																											
Live Fire Test and Evaluation	[Blue bar spanning FY 2021 Q2]																											
Initial Operational Test and Evaluation	[Blue bar spanning FY 2021 Q3]																											
Low Rate Initial Production 2	[Blue bar spanning FY 2021 Q3-Q4]																											
Training Round Demonstration	[Blue bar spanning FY 2019 Q1-Q2]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone B	1	2015	1	2015
Engineering and Manufacturing Development (EMD) Contract Phase I Awards	4	2015	4	2015
Engineering and Manufacturing Development (EMD) Phase I	4	2015	2	2017
Preliminary Design Review (PDR)	3	2016	3	2016
EMD Contract Phase II Award / Down-Select	2	2017	2	2017
Engineering and Manufacturing Development (EMD) Phase II	2	2017	4	2020
Critical Design Review	1	2020	1	2020
Developmental Test and Evaluation (DT&E)	2	2020	4	2020
Milestone C	4	2020	4	2020
Low Rate Initial Production 1	4	2020	4	2021
Live Fire Test and Evaluation	2	2021	2	2021
Initial Operational Test and Evaluation	2	2021	2	2021
Low Rate Initial Production 2	2	2021	2	2022
Evaluation for Future Combat Platforms	1	2018	4	2018
Training Round Demonstration	1	2019	3	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev			Project (Number/Name) EL9 / Ammunitions Logistics Prototyping				
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
EL9: Ammunitions Logistics Prototyping	-	1.684	2.329	1.701	-	1.701	0.704	0.999	1.019	1.039	0.000	9.475
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project EL9 Ammunitions Logistics Prototyping supports the future force by improving the distribution, management, reliability and survivability of ammunition through the advanced development, integration, and demonstration of logistics system enablers. These enablers will improve the efficiency and effectiveness of ammunition operations, to include retrograde, while reducing the logistics footprint on the battlefield. Technology areas addressed include handling, distribution, and management (strategic and tactical), prognostics, diagnostics, and asset visibility, explosives safety, and adaptive and environmentally friendly packaging and palletization. The efficient deployment and sustainment of reliable ammunition is vital to success on the battlefield. This project enhances the operational effectiveness of the ammunition logistics system to ensure the distribution of reliable ammunition to the warfighter. Fiscal Year (FY) 2021 funding will continue integrating the munitions health monitoring system with additional ammunition items, improve health monitoring survivability, and conduct qualification tests and continue to integrate passive time/temperature exposure sensors with additional ammunition items and conduct qualification testing. All research and development initiatives will be supporting the cross functional teams and the multi domain operations modernization objectives through deployment of prototypes for user evaluation.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Munitions Survivability and Logistics Enablers	1.684	2.223	1.701	-	1.701
Description: This program will develop ammunition logistics systems that improve munitions survivability and logistics					
FY 2020 Plans: Continued to integrate the munitions health monitoring system with additional ammunition items and conduct qualification tests. Continued to integrate passive time/temperature exposure sensor with ammunition items and conduct qualification testing.					
FY 2021 Base Plans: Continue to integrate passive time/temperature exposure sensor including exploring alternative technologies. Will continue to integrate the munitions health monitoring system with additional ammunition items including item specific form factors.					
FY 2020 to FY 2021 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EL9 / Ammunitions Logistics Prototyping

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Decrease due to completion of qualification testing on munitions health monitoring system for Excalibur.					
Title: FY 2020 SBIR/STTR Transfer	-	0.106	-	-	-
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	1.684	2.329	1.701	-	1.701

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

N/A

Remarks

D. Acquisition Strategy

The acquisition strategy is to develop and test the Munitions Health Monitoring items and conduct a Technology Readiness Assessment (TRA) to ensure readiness for insertion into families of end items.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EL9 / Ammunitions Logistics Prototyping
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.106		-		-		-	0.000	0.106	-
Subtotal			-	-		0.106		-		-		-	0.000	0.106	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Contractor	C/FFP	Karagozian & Case : Glendale, CA	0.534	1.165	Mar 2019	1.593	Dec 2019	0.801	Dec 2020	-		0.801	0.000	4.093	-
Contractor	C/FFP	Phase IV : Boulder, CO	-	0.460	Mar 2019	-		-		-		-	0.000	0.460	-
Contractor	C/FFP	InnoSense : Torrance, CA	-	-		-		0.300	Mar 2021	-		0.300	0.000	0.300	-
Subtotal			0.534	1.625		1.593		1.101		-		1.101	0.000	4.853	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Combat Capabilities Development Command, Armaments Center (CCDC, AC)	MIPR	Picatinny Arsenal : NJ	0.252	0.059	Dec 2018	0.365	Dec 2019	0.300	Dec 2020	-		0.300	0.000	0.976	-
Subtotal			0.252	0.059		0.365		0.300		-		0.300	0.000	0.976	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EL9 / Ammunitions Logistics Prototyping

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 Development - Munitions Health Monitoring System (RR																												
System Development - Low Cost Thermal Indicator																												
System Development - Plastic Cylindrical Container																												
System Development - Plastic Rectangular Container																												
System Development - Next Generation Temperature/Humidity Sensor																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EL9 / Ammunitions Logistics Prototyping

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
System Development - Munitions Health Monitoring System (RRAPDS)	2	2018	4	2023
System Development - Low Cost Thermal Indicator	1	2020	2	2023
System Development - Plastic Cylindrical Container	1	2022	4	2023
System Development - Plastic Rectangular Container	1	2022	4	2024
System Development - Next Generation Temperature/Humidity Sensor	1	2021	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP2 / Shoulder-Launched Munitions			
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
EP2: <i>Shoulder-Launched Munitions</i>	-	0.000	4.100	10.390	-	10.390	0.000	0.000	0.000	0.000	0.000	14.490
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Individual Assault Munition (IAM) will be a lightweight Shoulder Launched Munition (SLM) capability for combat units at the individual Soldier level. As an improvement over existing Shoulder Launched Munitions, the solution will fit within the Soldier Lethality Modernization Priority, by reducing Soldier load, while providing tactical innovation capable of extending overmatch against near-peer adversaries in a joint, multi-domain, high-intensity conflict. The IAM will allow Soldiers to conduct Urban Operations with an ability to defeat targets in an open space or in defilade at extended ranges. It will also allow Soldiers to defeat adversaries protected by field expedient structures and light armored vehicles. This solution will be effective day or night with the ability to safely engage targets from within enclosures using single hearing protection, increasing Soldier survivability. This solution will combine the capabilities of the existing Bunker Defeat Munition (BDM) and the AT4 Confined Space - Reduced Sensitivity (AT4CS-RS), which will allow for reduced Soldier load and training complexity, as well as reducing the logistics burden for Light Infantry, Combat Engineers, and Special Operations Forces. Fiscal Year (FY) 2021 funding will provide the Army the opportunity to evaluate various developmental munitions to achieve emerging increased capability as an Individual Assault Munition. The Individual Assault Munition Capabilities Development Document (CDD) was approved on 11 March 2016.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Individual Assault Munition (IAM)	-	3.914	10.390	-	10.390
Description: As an improvement over existing Shoulder Launched Munitions, IAM will fit within the Soldier Lethality Modernization Priority, by reducing Soldier load, while providing tactical innovation capable of extending overmatch against near-peer adversaries in a joint, multi-domain, high-intensity conflict. The IAM will allow Soldiers to conduct Urban Operations with an ability to defeat targets in an open space or in defilade at extended ranges. It will also allow Soldiers to defeat adversaries protected by field expedient structures and light armored vehicles. This solution will be effective day or night with the ability to safely engage targets from within enclosures using single hearing protection, increasing Soldier survivability. This solution will combine the capabilities of the existing BDM and the AT4CS-RS, which will allow for reduced Soldier load and training complexity, as well as reducing the logistics burden for Light Infantry, Combat Engineers, and Special Operations Forces.					
FY 2020 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP2 / <i>Shoulder-Launched Munitions</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 funding supported the evaluation and development of system technology advancements to ensure the soldier has increased capabilities to engage targets at close ranges within enclosures.</p> <p>FY 2021 Base Plans: FY 2021 funding will continue to support the developmental shoulder-launched munition build and hardware testing to ensure the soldier has increased capabilities to engage targets at close and extended ranges, in the open, in defilade, behind field expedient structures.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase in funding from FY 2020 to FY 2021 reflects additional requirements to support activities related to Engineering and Manufacturing Development and qualification testing.</p>					
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638</p>	-	0.186	-	-	-
Accomplishments/Planned Programs Subtotals	-	4.100	10.390	-	10.390

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

N/A

Remarks

D. Acquisition Strategy

The IAM acquisition strategy is to award multiple Other Transaction Authority (OTA) contracts to acquire test assets to evaluate performance against the IAM CDD. Upon successful IAM SLM testing, the winning candidate will enter Milestone C and be used for future procurement.

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP2 / Shoulder-Launched Munitions							
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	-	-		0.186		-		-		-	0.000	0.186	-
Subtotal			-	-		0.186		-		-		-	0.000	0.186	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
Shoulder Launched Munitions (SLM) Development Contract	MIPR	Defense Ordnance Technology Consortium (DOTC) : Picatinny Arsenal, NJ	-	-		3.307	Mar 2020	8.690	Nov 2020	-		8.690	0.000	11.997	-
Subtotal			-	-		3.307		8.690		-		8.690	0.000	11.997	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
Engineering Support	MIPR	Combat Capabilities Development Command, Armaments Center (CCDC, AC) : Picatinny Arsenal, NJ	-	-		0.607	Dec 2019	0.700	Oct 2020	-		0.700	0.000	1.307	-
Subtotal			-	-		0.607		0.700		-		0.700	0.000	1.307	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
Evaluation Test	TBD	TBD : TBD	-	-		-		1.000	May 2021	-		1.000	0.000	1.000	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP2 / Shoulder-Launched Munitions

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				
Individual Assault Munition (IAM) Milestone B					▲ 1 MS-B																											
Engineering, Manufacturing and Development Contract					■ EMD Contract																											
Test and Evaluation					■ Test and Eval																											
Milestone C / Type Classification Decision					▲ 2 MS-C / TC Dec																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP2 / <i>Shoulder-Launched Munitions</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Individual Assault Munition (IAM) Milestone B	2	2020	2	2020
Engineering, Manufacturing and Development Contract	2	2020	4	2021
Test and Evaluation	3	2021	4	2021
Milestone C / Type Classification Decision	4	2021	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev					Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber		
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
EP3: <i>Reduced Range Ammunition - Small Caliber</i>	-	4.432	8.376	15.377	-	15.377	14.873	5.095	0.000	0.000	0.000	48.153
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The small caliber Reduced Range Ammunition (RRA) Project is a critical technology development in response to the 7.62 millimeter (mm) and .50 caliber Capabilities Development Documents (CDD). The overall objective of RRA is to provide training ammunition suitable for use on military installations with Surface Danger Zone (SDZ) restrictions. The relatively long maximum range of the 7.62mm and .50 caliber service ammunition poses challenges on training ranges in range restricted areas. RRA will mitigate a training gap on installations by providing a materiel solution that meets training needs while shortening and condensing the SDZ. This will allow soldiers to train with 7.62mm and .50 caliber weapons on restricted ranges. The RRA cartridge design will be compatible with all Army 7.62mm and .50 caliber weapons, but specifically optimized to work in the M240 and M2 Machine Guns. Fiscal Year (FY) 2021 funding supports continuing Engineering and Manufacturing Development (EMD) efforts, performing a Technical Readiness Review (TRR), conducting Production Qualification Testing (PQT), and performing activities to prepare for ammunition production transition to the Lake City Army Ammunition Plant (LCAAP) on the 7.62mm variant. FY 2021 also includes continuing the EMD effort, conducting a Critical Design Review (CDR), performing a User Evaluation / Soldier Touch Point (STP), and performing PQT on the 50 caliber variant. FY 2021 includes continuing activities to evaluate RRA ammunition prototypes and designs for the Next Generation Squad Weapon (NGSW) systems.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Engineering and Manufacturing Development 7.62mm	4.432	3.374	7.200	-	7.200
Description: EMD Activities for 7.62mm Reduced Range Ammunition.					
FY 2020 Plans: Continued EMD efforts and performed 7.62mm RRA design review and qualification testing.					
FY 2021 Base Plans: Continue EMD efforts, perform a TRR, conduct PQT, and perform activities to prepare for transition to the LCAAP.					
FY 2020 to FY 2021 Increase/Decrease Statement: Planned increase to procure test quantities in preparation for PQT.					
Title: Engineering and Manufacturing Development .50 Caliber	-	4.549	8.000	-	8.000
Description: EMD Activities for .50 Cal Reduced Range Ammunition.					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 Plans: Continued Engineering, EMD efforts and perform .50 Cal RRA PDR and qualification testing.</p> <p>FY 2021 Base Plans: Continue the EMD effort, conduct a CDR, perform a User Evaluation / STP, and performing PQT.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Planned increase to procure test quantities from 3 vendors in preparation for PQT.</p>					
<p>Title: Next Generation Squad Weapon (NGSW) Reduced Range Technology Evaluation</p> <p>Description: Concept development/evaluation of RRA ammunition for the Next Generation Squad Weapons (NGSW).</p> <p>FY 2020 Plans: Explored / evaluated RRA concepts for the NGSW.</p> <p>FY 2021 Base Plans: Evaluate RRA ammunition prototypes and designs for the NGSW.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decrease is due to planned RRA activities for the NGSW occurring in FY 2021.</p>	-	0.073	0.177	-	0.177
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638</p>	-	0.380	-	-	-
Accomplishments/Planned Programs Subtotals	4.432	8.376	15.377	-	15.377

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
• EL7: Reduced Range Ammunition	2.090	-	0.000	-	0.000	-	-	-	-	0.000	2.090

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber

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

Budget Activity 5 Program Element 0604802A Weapons and Munitions - Eng Dev Project EP3, Reduced Range Ammunition transitioned from Budget Activity 4 PE 0603639A Tank and Medium Caliber Ammunition Project EL7 Reduced Range Ammunition in FY 2019 for the 7.62mm variant. The .50 Caliber variant transitions in FY 2020.

D. Acquisition Strategy

After 7.62mm Milestone (MS) B in FY 2019, the Government intends to award Engineering and Manufacturing Development (EMD) contracts. The Government will then award competitive contracts for 7.62mm Pre-Production Qualification Testing (PPQT) hardware in FY 2020 and down-select to a single contractor to complete EMD. The .50 Caliber program follows a similar strategy. The Government intends to award multiple competitive contracts for the .50 Caliber EMD.

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP3 / Reduced Range Ammunition - Small Caliber							
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	-	-		0.380		-		-		-	0.000	0.380	-
Subtotal			-	-		0.380		-		-		-	0.000	0.380	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
Development Contract 7.62mm EMD # 1	Option/CPFF	General Dynamics : Florham Park, NJ	-	0.900	Sep 2019	0.770	Feb 2020	-		-		-	Continuing	Continuing	Continuing
Development Contract 7.62mm EMD # 2	Option/CPFF	Nammo Tally : Mesa, Arizona	-	0.750	Sep 2019	0.715	Feb 2020	-		-		-	Continuing	Continuing	Continuing
Development Contract 7.62mm EMD Down-Select	Option/CPFF	To Be Determined : To Be Determined	-	-		-		2.000	Jan 2021	-		2.000	Continuing	Continuing	Continuing
Development Contract 7.62mm Transition to Lake City Army Ammunition Plant (LCAAP)	Option/CPFF	OLIN Winchester Corporation : Lake City, Missouri	-	-		-		1.000	Jan 2021	-		1.000	0.000	1.000	-
Development Contract 7.62mm Tracer Manufacturing	Option/CPFF	OLIN Winchester Corporation : Lake City, Missouri	-	-		-		1.000	Jan 2021	-		1.000	0.000	1.000	-
Development Contract .50 Cal Contractor 1	C/CPFF	American Ordnance : Middletown, IA	-	-		0.765	Apr 2020	1.350	Jan 2021	-		1.350	Continuing	Continuing	Continuing
Development Contract .50 Cal Contractor 2	Option/CPFF	General Dynamics : Florham Park, NJ	-	-		0.815	Feb 2020	1.800	Jan 2021	-		1.800	Continuing	Continuing	Continuing
Development Contract .50 Cal Contractor 3	Option/CPFF	Nammo Tally : Mesa, Arizona	-	-		0.815	Feb 2020	1.800	Jan 2021	-		1.800	Continuing	Continuing	Continuing
Next Generation Squad Weapon Reduce Range Ammunition (NGSW RRA) Concept Evaluation	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) :	-	-		0.165	Oct 2019	-		-		-	Continuing	Continuing	Continuing

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber
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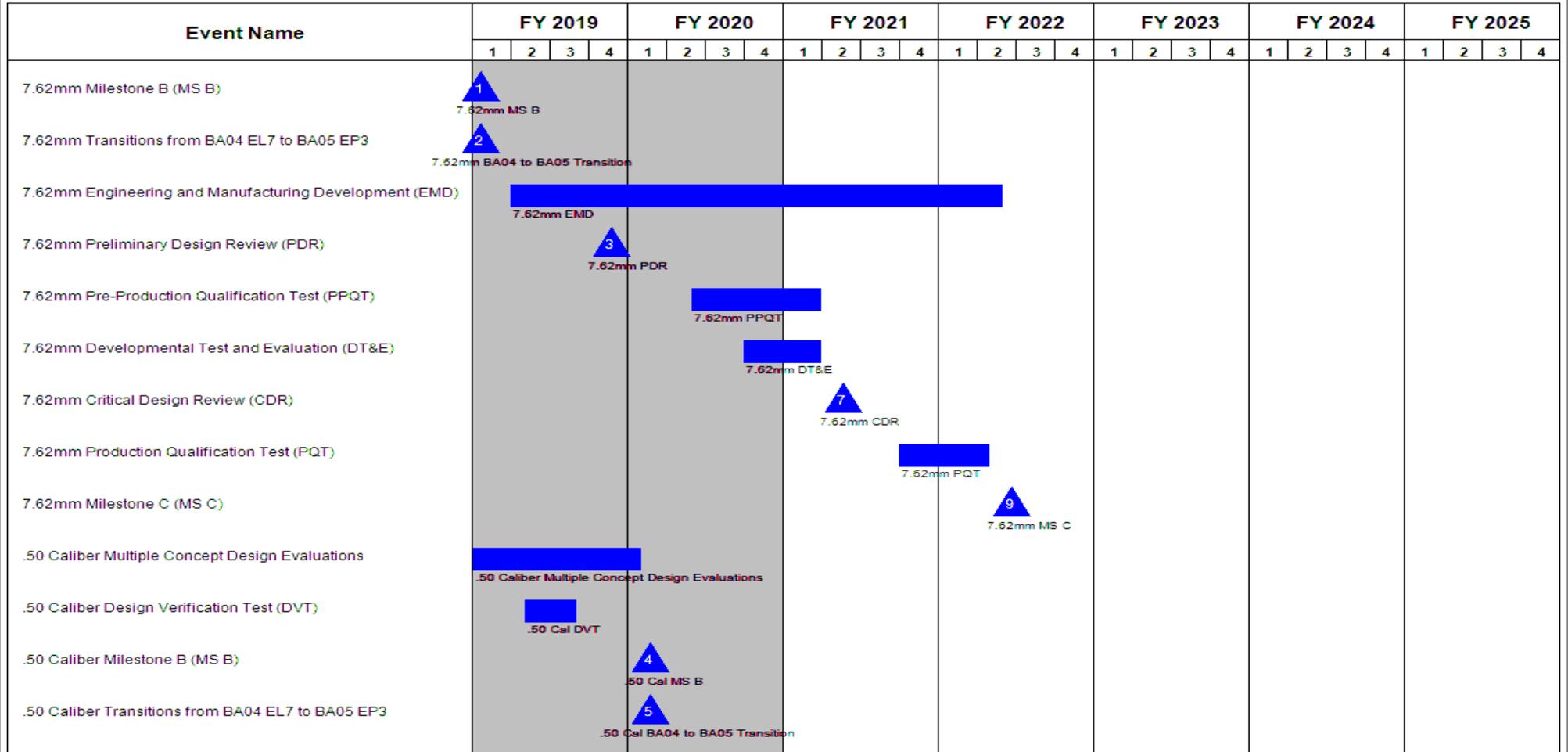
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
		Picatinny Arsenal, New Jersey													
Prototype Development	Option/CPAF	Booz Allen Hamilton : Dover, NJ	-	0.309	Nov 2018	0.215	Feb 2020	-		-		-	0.000	0.524	-
Subtotal			-	1.959		4.260		8.950		-		8.950	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
Combat Capabilities Development Command, Armaments Center (CCDC AC) 7.62mm	MIPR	Picatinny Arsenal : New Jersey	-	1.759	Oct 2018	0.965	Oct 2019	1.500	Oct 2020	-		1.500	Continuing	Continuing	Continuing
Combat Capabilities Development Command, Armaments Center (CCDC AC) .50 Cal	MIPR	Picatinny Arsenal : New Jersey	-	-		1.715	Oct 2019	1.000	Oct 2020	-		1.000	Continuing	Continuing	Continuing
Combat Capabilities Development Command, Armaments Center (CCDC AC) NGSW	MIPR	Picatinny Arsenal : New Jersey	-	0.232	Oct 2018	-		0.177	Oct 2020	-		0.177	Continuing	Continuing	Continuing
Subtotal			-	1.991		2.680		2.677		-		2.677	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
Design Verification Test (DVT 7.62mm)	MIPR	U.S. Army Test Center : Yuma, Arizona	-	0.482	Dec 2018	-		-		-		-	0.000	0.482	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP3 / <i>Reduced Range Ammunition - Small Caliber</i>



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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber

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
.50 Caliber Engineering and Manufacturing Development (EMD)					.50 Cal EMD																							
.50 Caliber Preliminary Design Review (PDR)									6 .50 Cal PDR																			
.50 Caliber Pre-Production Qualification Test (PPQT)									.50 Cal PPQT																			
.50 Caliber Soldier Touch Point (STP)													.50 Cal STP															
.50 Caliber Critical Design Review (CDR)													8 .50 Cal CDR															
.50 Caliber Production Qualification Test (PQT)																	.50 Cal PQT											
.50 Caliber Milestone C (MS C)																					10 .50 Cal MS C							

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP3 / <i>Reduced Range Ammunition - Small Caliber</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
7.62mm Multiple Concept Design Evaluations	1	2017	4	2018
7.62mm Materiel Development Decision (MDD)	4	2017	4	2017
7.62mm Design Verification Test (DVT)	2	2018	3	2018
7.62mm Milestone B (MS B)	1	2019	1	2019
7.62mm Transitions from BA04 EL7 to BA05 EP3	1	2019	1	2019
7.62mm Engineering and Manufacturing Development (EMD)	1	2019	2	2022
7.62mm Preliminary Design Review (PDR)	4	2019	4	2019
7.62mm Pre-Production Qualification Test (PPQT)	2	2020	1	2021
7.62mm Developmental Test and Evaluation (DT&E)	4	2020	1	2021
7.62mm Critical Design Review (CDR)	2	2021	2	2021
7.62mm Production Qualification Test (PQT)	4	2021	2	2022
7.62mm Milestone C (MS C)	2	2022	2	2022
.50 Caliber Project Starts on BA04 EL7	1	2018	1	2018
.50 Caliber Multiple Concept Design Evaluations	1	2018	1	2020
.50 Caliber Materiel Development Decision (MDD)	2	2018	2	2018
.50 Caliber Design Verification Test (DVT)	2	2019	3	2019
.50 Caliber Milestone B (MS B)	1	2020	1	2020
.50 Caliber Transitions from BA04 EL7 to BA05 EP3	1	2020	1	2020
.50 Caliber Engineering and Manufacturing Development (EMD)	1	2020	2	2023
.50 Caliber Preliminary Design Review (PDR)	4	2020	4	2020
.50 Caliber Pre-Production Qualification Test (PPQT)	4	2020	2	2021
.50 Caliber Soldier Touch Point (STP)	2	2021	3	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP3 / <i>Reduced Range Ammunition - Small Caliber</i>

Events	Start		End	
	Quarter	Year	Quarter	Year
.50 Caliber Critical Design Review (CDR)	4	2021	4	2021
.50 Caliber Production Qualification Test (PQT)	1	2022	3	2022
.50 Caliber Milestone C (MS C)	2	2023	2	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo			
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
EP4: One-Way Luminescence for Small Caliber Ammo	-	5.855	8.547	13.977	-	13.977	6.981	7.393	2.998	0.000	0.000	45.751
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The One Way Luminescence (OWL) project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Families of Ammunition Capabilities Development Documents (CDD) and .50 Caliber Munitions CDD. Current small caliber ammunition tracer rounds are a pyrotechnic tracer mix which allows enemy forces to see the trace round and track its trajectory back to the shooter. The OWL projects objective is to develop and field a full tracer round, replace the current pyrotechnic cartridges with trace cartridges that are only visible to the shooter and soldiers in close proximity, increasing soldier survivability, and increasing lethality by incorporating Enhanced Performance Round (EPR) technology into the new tracer ammunition. 7.62mm and 5.56mm are the immediate focus; later followed by .50 Caliber cartridges and Next Generation Squad Weapons (NGSW) ammunition. Fiscal Year (FY) 2021 funding will support continuing Engineering and Manufacturing Development (EMD) efforts, performing Production Qualification Testing (PQT), performing Safety Release Tests, conducting Live-Fire Testing and Evaluation (LFT&E), conducting a Critical Design Review (CDR), conducting a Limited User Evaluation (LUE), and performing preparation activities for manufacturing at the Lake City Army Ammunition Plant (LCAAP) for the 7.62mm variant. FY 2021 funding will also support EMD efforts, Design Verification Tests (DVT), and preparation for the Preliminary Design Review (PDR) for the 5.56mm variant. FY 2021 also supports concept development/evaluation of OWL tracer solutions for .50 Caliber weapons and NGSW.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: EMD 7.62mm	5.855	8.153	7.200	-	7.200
Description: EMD efforts for the 7.62mm variant followed by OWL tracer solutions for .50 Caliber weapons.					
FY 2020 Plans: Continued EMD efforts, performed Pre-Production Qualification Testing (PPQT), performed development tests, and a User Assessment (UA) for the 7.62mm OWL ammunition.					
FY 2021 Base Plans: Continuing EMD efforts, perform PQT, perform Safety Release Tests, conduct LFT&E, conduct a Critical Design review (CDR), conduct a Limited User Evaluation (LUE), and perform preparation activities for manufacturing at the LCAAP.					
FY 2020 to FY 2021 Increase/Decrease Statement: Planned EMD activities for the 7.62mm OWL in FY 2021.					
Title: Prototype and Concept Evaluation for NGSW and .50 Caliber Ammunition	-	0.006	0.177	-	0.177

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Description: Supports concept development/evaluation of OWL tracer solutions for .50 Caliber weapons and NGSW.</p> <p>FY 2020 Plans: Evaluated OWL prototypes/concepts ammunition for the NGSW. Assessed OWL technologies for potential to adapt the technology into the NGSW ammunition. Evaluated OWL prototypes/concepts ammunition for .50 Caliber Weapons.</p> <p>FY 2021 Base Plans: Will continue to assess OWL technologies for potential to adapt the technology into the NGSW ammunition.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Planned ammunition concept evaluation efforts for the .50 Caliber weapons and the NGSW in FY 2021.</p>					
<p>Title: EMD 5.56mm</p> <p>Description: EMD efforts for the 5.56mm variants.</p> <p>FY 2021 Base Plans: Start EMD efforts, perform DVT, and begin preparation for the PDR.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The 5.56mm variant transitions from Budget Activity (BA) 4 Program Element (PE) 0603639A Tank and Medium Caliber Ammunition to BA5 PE 0604802A Weapons and Munitions - Eng Dev in FY 2021.</p>	-	-	6.600	-	6.600
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638</p>	-	0.388	-	-	-
Accomplishments/Planned Programs Subtotals	5.855	8.547	13.977	-	13.977

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo
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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>
• EB8: OWL for Small Caliber Ammunition	1.984	2.000	0.000	-	0.000	-	-	-	-	0.000	3.984

Remarks

OWL is a new tracer technology that will be applied to multiple calibers. The initial focus was on 7.62mm ammunition in FY 2015 followed by 5.56mm in FY 2018; and later followed by the .50 Caliber and NGSW ammunition. As the technology matured the effort transitioned from BA4 PE 0603639A Tank and Medium Caliber Ammunition Project EB8 One Way Luminescence (OWL) to BA5 PE 0604802A One-Way Luminescence for Small Caliber Ammo Project EP4 One Way Luminescence (OWL) for Small Caliber Ammunition in FY 2019 for 7.62mm, and FY 2021 for 5.56mm. The OWL cartridge will be compatible with all Army Small Caliber weapon systems, but optimized for Machine Guns and will provide improved lethality / target effects over the current tracer munition.

D. Acquisition Strategy

The OWL concept will be developed through Government and Industry prototyping efforts. Technology Readiness Assessments (TRAs) were conducted in FY 2017 and FY 2018 to evaluate the industry and Government concepts in order to proceed with the 7.62mm EMD. The 5.56mm, NGSW, and .50 Caliber cartridges will follow the 7.62mm schedule with EMD starting in FY 2021 for the 5.56mm variant. The new tracer cartridges will replace legacy tracers in each of the various small caliber configurations.

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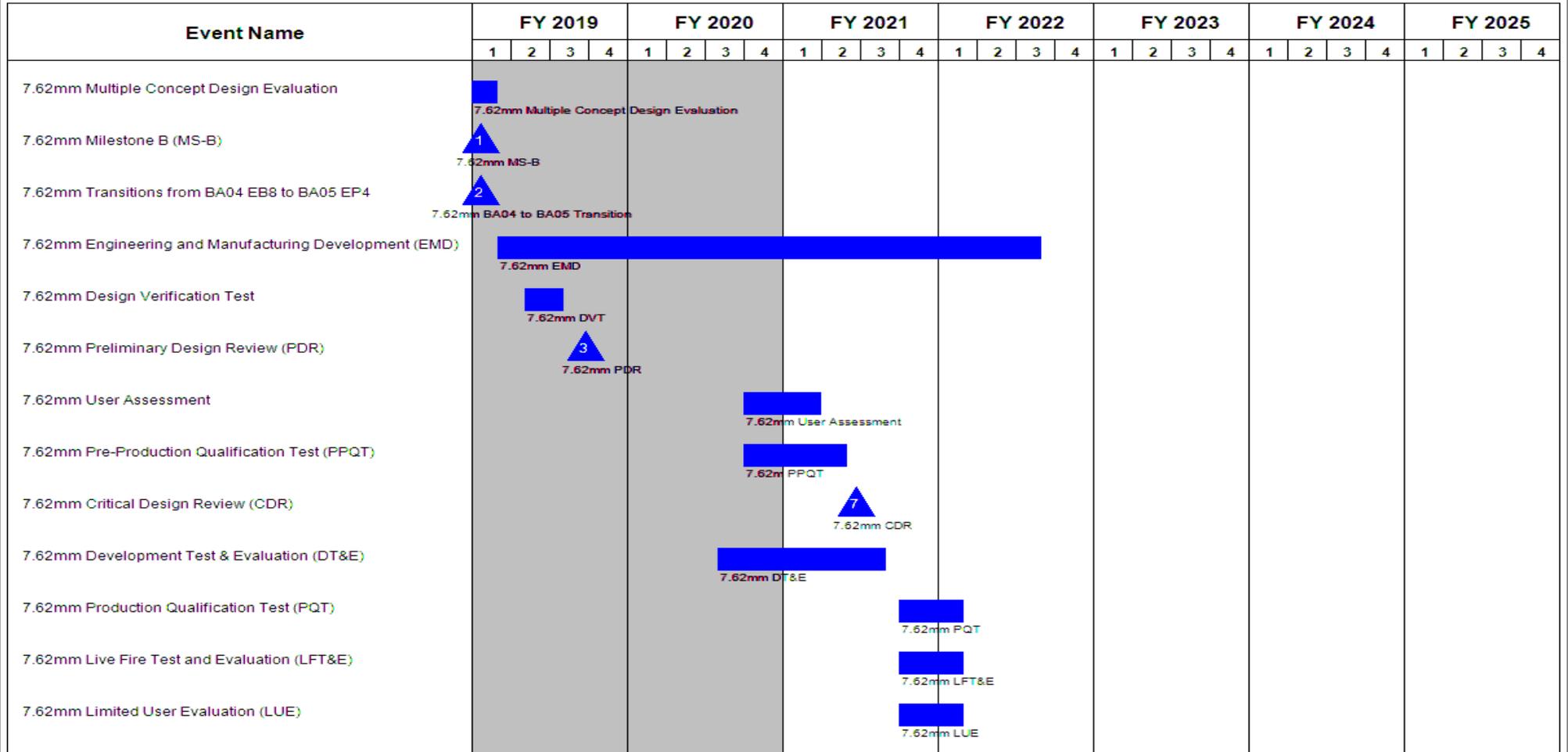
Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP4 / One-Way Luminescence for Small Caliber Ammo							
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	-	-		0.388		-		-		-	0.000	0.388	-
Subtotal			-	-		0.388		-		-		-	0.000	0.388	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
Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : New Jersey	-	0.014	Oct 2018	0.027	Oct 2019	0.015	Oct 2020	-		0.015	Continuing	Continuing	Continuing
EMD Contractor # 1 (7.62mm)	Option/CPFF	General Dynamics : Florham Park, NJ	-	1.000	Jan 2019	2.022	Jan 2020	-		-		-	0.000	3.022	-
EMD Contractor # 2 (7.62mm)	Option/CPFF	Nammo Tally : Mesa, AZ	-	1.082	Jan 2019	2.022	Jan 2020	-		-		-	0.000	3.104	-
Down-Selected EMD Contractor (7.62mm)	Option/CPFF	To be determined : To be determined	-	-		-		2.579	Oct 2020	-		2.579	Continuing	Continuing	Continuing
OWL Manufacturing Tooling Development (7.62mm)	Option/CPFF	JAK Tool Engineering Solutions : Cranbury, NJ	-	1.244	Nov 2018	-		0.200	Oct 2020	-		0.200	Continuing	Continuing	Continuing
Lake City Army Ammunition Plant Tech Integration	TBD	To be determined : Lake City, MO	-	-		-		0.700	Oct 2020	-		0.700	Continuing	Continuing	Continuing
EMD Contractor # 1 (5.56mm)	C/CPFF	To be determined : To be determined	-	-		-		1.990	Oct 2020	-		1.990	Continuing	Continuing	Continuing
EMD Contractor # 2 (5.56mm)	C/CPFF	To be determined : To be determined	-	-		-		1.990	Oct 2020	-		1.990	Continuing	Continuing	Continuing
OWL Manufacturing Tooling Development (5.56mm)	Option/CPFF	JAK Tool Engineering Solutions : Cranbury, NJ	-	-		-		0.265	Oct 2020	-		0.265	0.000	0.265	-

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP4 / One-Way Luminescence for Small Caliber Ammo							
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
Subtotal			-	3.340		4.071		7.739		-		7.739	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 (CCDC-AC) 7.62mm	MIPR	Picatinny Arsenal : New Jersey	-	1.739	Oct 2018	1.994	Oct 2019	2.756	Oct 2020	-		2.756	Continuing	Continuing	Continuing
Product Development Support (7.62mm)	Option/FFP	Leidos Inc. : Reston, VA	-	0.068	Mar 2019	-		-		-		-	0.000	0.068	-
CCDC Armaments Center (CCDC-AC) 5.56mm	MIPR	Picatinny Arsenal : New Jersey	-	-		-		1.905	Oct 2020	-		1.905	0.000	1.905	-
Safety Release Support (5.56mm)	MIPR	To be determined : To be determined	-	-		-		0.200	Oct 2020	-		0.200	0.000	0.200	-
OWL Solutions/Evaluation for NGSW	MIPR	CCDC Armaments Center : Picatinny Arsenal	-	-		-		0.177	Oct 2020	-		0.177	Continuing	Continuing	Continuing
Subtotal			-	1.807		1.994		5.038		-		5.038	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
U.S. Army Aberdeen Test Center (ATC) 7.62mm	MIPR	Aberdeen Proving Ground : Maryland	-	0.060	Oct 2018	1.172	Oct 2019	0.500	Oct 2020	-		0.500	Continuing	Continuing	Continuing
Independent Testing (7.62mm)	MIPR	Joint Munitions Command/ Bullet Suupy Organization : Lake City, MO	-	0.035	Oct 2018	-		-		-		-	0.000	0.035	-

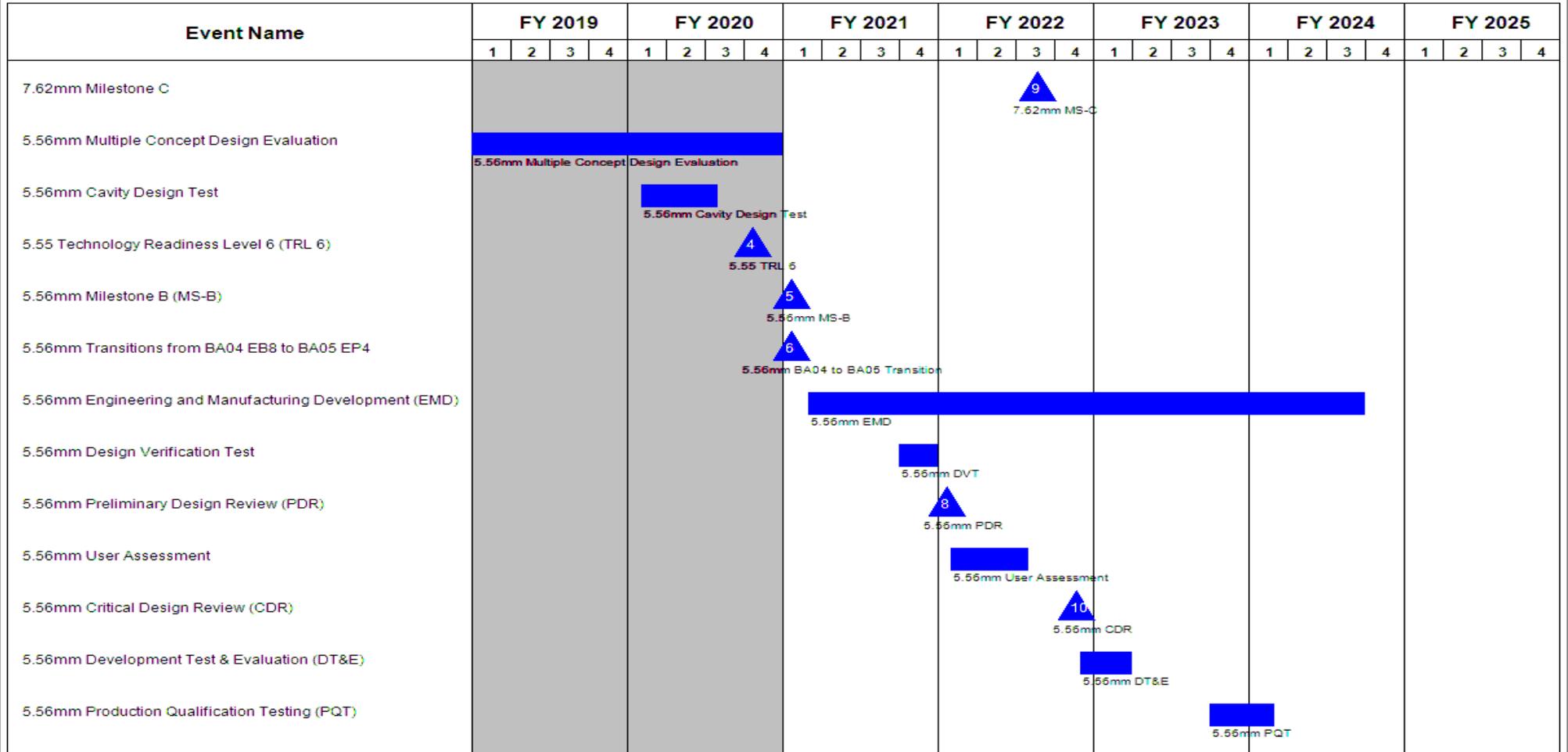
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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo



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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP4 / <i>One-Way Luminescence for Small Caliber Ammo</i>



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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev		Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo	

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				
5.56mm Live-Fire Test and Evaluation (LFT&E)																																
5.56mm Milestone C (MS-C)																																
Next Generation Squad Weapon (NGSW) & .50 caliber Concept Design Evaluation																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
7.62mm Materiel Development Decision (MDD)	4	2016	4	2016
7.62mm Multiple Concept Design Evaluation	1	2015	1	2019
7.62mm Milestone B (MS-B)	1	2019	1	2019
7.62mm Transitions from BA04 EB8 to BA05 EP4	1	2019	1	2019
7.62mm Engineering and Manufacturing Development (EMD)	1	2019	3	2022
7.62mm Design Verification Test	2	2019	3	2019
7.62mm Preliminary Design Review (PDR)	3	2019	3	2019
7.62mm User Assessment	4	2020	1	2021
7.62mm Pre-Production Qualification Test (PPQT)	4	2020	2	2021
7.62mm Critical Design Review (CDR)	2	2021	2	2021
7.62mm Development Test & Evaluation (DT&E)	3	2020	3	2021
7.62mm Production Qualification Test (PQT)	4	2021	1	2022
7.62mm Live Fire Test and Evaluation (LFT&E)	4	2021	1	2022
7.62mm Limited User Evaluation (LUE)	4	2021	1	2022
7.62mm Milestone C	3	2022	3	2022
5.56mm Materiel Development Decision (MDD)	3	2018	3	2018
5.56mm Project Starts on BA04 EB8	3	2018	3	2018
5.56mm Multiple Concept Design Evaluation	4	2018	4	2020
5.56mm Cavity Design Test	1	2020	3	2020
5.55 Technology Readiness Level 6 (TRL 6)	4	2020	4	2020
5.56mm Milestone B (MS-B)	1	2021	1	2021
5.56mm Transitions from BA04 EB8 to BA05 EP4	1	2021	1	2021

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo
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Events	Start		End	
	Quarter	Year	Quarter	Year
5.56mm Engineering and Manufacturing Development (EMD)	1	2021	3	2024
5.56mm Design Verification Test	4	2021	4	2021
5.56mm Preliminary Design Review (PDR)	1	2022	1	2022
5.56mm User Assessment	1	2022	3	2022
5.56mm Critical Design Review (CDR)	4	2022	4	2022
5.56mm Development Test & Evaluation (DT&E)	4	2022	1	2023
5.56mm Production Qualification Testing (PQT)	4	2023	1	2024
5.56mm Live-Fire Test and Evaluation (LFT&E)	4	2023	1	2024
5.56mm Milestone C (MS-C)	4	2024	4	2024
Next Generation Squad Weapon (NGSW) & .50 caliber Concept Design Evaluation	1	2020	2	2021

Note

As the technology matures, the One Way Luminescence (OWL) projects transitions from BA4 PE 0603639A Tank and Medium Caliber Ammunition Project EB8 One Way Luminescence (OWL) to BA5 PE 0604802A One-Way Luminescence for Small Caliber Ammo Project EP4 One Way Luminescence (OWL) for Small Caliber Ammunition

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo			
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
EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	-	20.247	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	20.247
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Advanced Armor-Piercing (ADVAP) project is a critical technology development in response to the 7.62 millimeter (mm) and 5.56mm Family of Ammunition Capabilities Development Documents (CDD). The nomenclature for the 7.62mm ADVAP is XM1158. The overall objective of the ADVAP project is to develop and Full Materiel Release (FMR) both 7.62mm XM1158 cartridge for the M240 machine gun and ADVAP ammunition in calibers below 7.62mm. The ADVAP ammunition in calibers below 7.62mm for the Next Generation Squad Weapons (NGSW) is referred to as the Special Purpose ammunition. The objective is to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges.

NGSW Family of Ammunition: The NSGW ammo is a new ammunition technology under development for use in the Next Generation Squad Weapon systems. The objective is to develop and FMR the new ammunition. No funding requested in Fiscal Year (FY) 2021 on Army Program Element (PE) 0604802A / Project EP5.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: 7.62mm Engineering & Manufacturing Development (EMD)	11.978	-	-	-	-
Description: Develop, demonstrate, and qualify XM1158 Small Caliber Ammunition 7.62mm ADVAP cartridges in order to defeat threat targets and provide overmatch capability versus a broad spectrum of hard targets.					
Title: NSGW Rapid Prototyping and Development	8.269	-	-	-	-
Description: Develop, demonstrate, and qualify new ammunition for the NSGW systems.					
Accomplishments/Planned Programs Subtotals	20.247	-	-	-	-

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
• EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	5.334	6.821	0.000	-	0.000	-	-	-	-	0.000	12.155

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo
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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
• F57510: CTG, 7.62mm <i>Advanced Armor Piercing, XM1158</i>	20.700	21.013	22.960	-	22.960	25.656	25.666	-	-	0.000	115.995
• FL4: <i>Small Caliber Ammo for Next Gen Squad Weapons</i>	-	18.180	30.600	-	30.600	28.723	24.976	11.739	11.858	0.000	126.076

Remarks

Budget Activity 4 PE 0603639A, Project EC2-RDTE/Adv Armor-Piercing (ADVAP) for Small Cal Ammo: This funding line started the development, technology maturation, and Pre-Engineering & Manufacturing Development (Pre-EMD) work on 7.62mm ADVAP cartridges and initiates rapid prototyping work on the Special Purpose (SP)/ADVAP ammunition in calibers below 7.62mm.

Procurement of Ammunition, Army F57510-AMMO/CTG, 7.62mm Advanced Armor Piercing, XM1158: This funding line supports the procurement of 7.62mm XM1158 Advanced Armor-Piercing (ADVAP) Ball Cartridges 4Ball/1 M62A1 Tracer linked Cartridges.

Budget Activity 5 PE 0604802A, Project FL4-RDTE/Small Caliber Ammo for Next Gen Squad Weapons: This funding line continues rapid development/prototyping work on the Next Gen General Purpose (GP) ammunition and Special Purpose (SP) ammunition.

D. Acquisition Strategy

Advanced Armor-Piercing (ADVAP): The ADVAP ammunition programs will use a Government developed design and manufacturing processes. Multiple component contracts will be awarded to purchase raw materials and equipment. In FY 2017, the 7.62mm variant, achieved Milestone B; completed Production Decision Review (PDR), and Integrated Baseline Review (IBR) leading to the establishment of the Performance Measurement Baseline and the approval to begin manufacturing the Pre-Production Qualification Testing (PPQT) sample.

Next Generation Squad Weapon (NGSW) Family of Ammunition: The Next Generation Squad Weapon (NGSW) ammunition program will utilize the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding to develop ammunition concepts/designs for the General Purpose (GP) variant and the Special Purpose (SP) variant. Contractors will be funded to rapidly develop projectile designs/concepts with a final down-select to one design prior to Urgent Material Release (UMR) in FY 2022. Follow-on development efforts for additional NGSW ammunition variants including tracer ammunition, blank ammunition, reduced range ammunition, and Close Combat Mission Capability Kit (CCMCK) ammunition will start in FY 2022.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Advanced Armor-Piercing (ADVAP) Raw Materials	Various	Various : New Jersey	5.008	1.066	Jan 2019	-		-		-		-	0.000	6.074	-
Next Generation Squad Weapon (NGSW) Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : New Jersey	-	0.005	Oct 2018	-		-		-		-	0.000	0.005	-
Next Generation Squad Weapon (NGSW) Rapid Prototyping Projectile Development	C/CPFF	Northrop Grumman Innovation Systems : Independence, Missouri	-	3.800	Jan 2019	-		-		-		-	0.000	3.800	-
Next Generation Squad Weapon (NGSW) Development Contractor # 1	C/CPFF	Textron Systems : Hunt Valley, Maryland	-	2.375	Sep 2019	-		-		-		-	0.000	2.375	-
Next Generation Squad Weapon (NGSW) Development Contractor # 2	C/CPFF	Sig Sauer : Newington, New Hampshire	-	0.075	Sep 2019	-		-		-		-	0.000	0.075	-
Next Generation Squad Weapon (NGSW) Development Contractor # 3	C/CPFF	General Dynamics : Florham Park, New Jersey	-	1.800	Sep 2019	-		-		-		-	0.000	1.800	-
Subtotal			5.008	9.121		-		-		-		-	0.000	14.129	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Advanced Armor-Piercing (ADVAP) CCDC Armaments Center Support	MIPR	Combat Capabilities Development Command, Armaments Center (CCDC, AC) :	10.128	5.802	Oct 2018	-		-		-		-	0.000	15.930	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
		Picatinny Arsenal, New Jersey													
Advanced Armor-Piercing (ADVAP) Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	2.816	1.536	Oct 2018	-		-		-		-	0.000	4.352	-
Advanced Armor-Piercing (ADVAP) Manufacturing Support	C/FP	UTRS : New Jersey	1.930	0.568	Apr 2019	-		-		-		-	0.000	2.498	-
Advanced Armor-Piercing (ADVAP) De-mil Evaluation Support	MIPR	Tooele Army Depot : Tooele, Utah	-	0.197	Oct 2018	-		-		-		-	0.000	0.197	-
Next Generation Squad Weapon (NGSW) CCDC Armaments Center (CCDC AC)	MIPR	Combat Capabilities Development Command, Armaments Center (CCDC, AC) : Picatinny Arsenal, New Jersey	-	0.214	Oct 2018	-		-		-		-	0.000	0.214	-
Subtotal			14.874	8.317		-		-		-		-	0.000	23.191	N/A

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			
Advanced Armor-Piercing (ADVAP) U.S. Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	0.503	0.559	Oct 2018	-		-		-		-	0.000	1.062	-
Advanced Armor-Piercing (ADVAP) Testing CCDC Armaments Center (CCDC AC)	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) :	1.200	0.650	Oct 2018	-		-		-		-	0.000	1.850	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo

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
ADVAP 7.62mm Engineering & Manufacturing Development	[Redacted]																											
	ADVAP 7.62mm EMD																											
ADVAP 7.62mm Development Test & Evaluation	[Redacted]																											
	ADVAP 7.62mm DT&E																											
ADVAP 7.62mm Urgent Materiel Release (UMR)	1																											
	ADVAP 7.62mm UMR																											
ADVAP 7.62mm Milestone C				5																								
					ADVAP 7.62mm MS-C																							
ADVAP 7.62mm Type Classification (TC)				6																								
					ADVAP 7.62mm TC																							
ADVAP 7.62mm Full Materiel Release (FMR)								8																				
					ADVAP 7.62mm FMR																							
NGSW Ammo Rapid Prototyping	[Redacted]																											
	NGSW Ammo RP																											
NGSW Ammo Initial Product Review 1 (IPR 1) Special Purpose	2																											
	NGSW Ammo IPR 1 SP																											
NGSW Ammo Preliminary Design Review General Purpose (PDR-GP)				3																								
					NGSW Ammo PDR-GP																							
NGSW Ammo Initial Product Review 2 (IPR 2) Special Purpose				4																								
					NGSW Ammo IPR 2 SP																							
NGSW Ammo Project BA05 EP5 to Project BA05 FL4 Transition								7																				
									NGSW Ammo EP5 to FL4 Transition																			
NGSW Ammo Preliminary Design Review Special Purpose (PDR-SP)								9																				
									NGSW Ammo PDR-SP																			
NGSW Ammo Critical Design Review General Purpose (CDR-GP)								10																				
									NGSW Ammo CDR-GP																			

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo

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
NGSW Ammo Prototype Test 1																												
NGSW Ammo Initial Product Review 3 (IPR 3) Special Purpose																												
NGSW Ammo Critical Design Review Special Purpose (CDR-SF)																												
NGSW Ammo Prototype Test 2																												
NGSW Ammo Safety Testing SP																												
NGSW Ammo Urgent Materiel Release General Purpose (UMR GP)																												
NGSW Ammo Urgent Materiel Release Special Purpose (UMR SP)																												
NGSW Ammo Rapid Fielding																												
NGSW Ammo Production Qualification Testing Special Purpose (PQT SP)																												
NGSW Ammo Full Materiel Release (FMR)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP5 / <i>Adv Armor-Piercing (ADVAP) for Small Caliber Ammo</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ADVAP 7.62mm Advanced Concept Development	1	2015	1	2017
ADVAP 7.62mm Prototype Test & Evaluation	1	2015	1	2017
7.62mm Materiel Development Decision (MDD)	4	2015	4	2015
ADVAP 7.62mm Milestone B	1	2017	1	2017
ADVAP 7.62mm Engineering & Manufacturing Development	2	2017	4	2019
ADVAP 7.62mm Preliminary Design Review (PDR)	2	2017	2	2017
ADVAP 7.62mm Pre-Production Qualification Testing (PPQT)	1	2018	1	2018
ADVAP 7.62mm Critical Design Review (CDR)	2	2018	2	2018
ADVAP 7.62mm Development Test & Evaluation	1	2019	3	2019
ADVAP 7.62mm Urgent Materiel Release (UMR)	2	2019	2	2019
ADVAP 7.62mm Milestone C	4	2019	4	2019
ADVAP 7.62mm Type Classification (TC)	4	2019	4	2019
ADVAP 7.62mm Full Materiel Release (FMR)	2	2020	2	2020
NGSW Ammo Rapid Prototyping	1	2019	2	2024
NGSW Ammo Initial Product Review 1 (IPR 1) Special Purpose	2	2019	2	2019
NGSW Ammo Preliminary Design Review General Purpose (PDR-GP)	3	2019	3	2019
NGSW Ammo Initial Product Review 2 (IPR 2) Special Purpose	4	2019	4	2019
NGSW Ammo Project BA05 EP5 to Project BA05 FL4 Transition	1	2020	1	2020
NGSW Ammo Preliminary Design Review Special Purpose (PDR-SP)	2	2020	2	2020
NGSW Ammo Critical Design Review General Purpose (CDR-GP)	3	2020	3	2020
NGSW Ammo Prototype Test 1	3	2020	4	2020
NGSW Ammo Initial Product Review 3 (IPR 3) Special Purpose	4	2020	4	2020

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo
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Events	Start		End	
	Quarter	Year	Quarter	Year
NGSW Ammo Critical Design Review Special Purpose (CDR-SP)	2	2021	2	2021
NGSW Ammo Prototype Test 2	2	2021	3	2021
NGSW Ammo Safety Testing SP	1	2022	3	2022
NGSW Ammo Urgent Materiel Release General Purpose (UMR GP)	4	2022	4	2022
NGSW Ammo Urgent Materiel Release Special Purpose (UMR SP)	4	2022	4	2022
NGSW Ammo Rapid Fielding	4	2022	1	2026
NGSW Ammo Production Qualification Testing Special Purpose (PQT SP)	1	2023	2	2023
NGSW Ammo Full Materiel Release (FMR)	2	2024	2	2024

Note

Notes:
Advanced Armor-Piercing (ADVAP)
Next Generation Squad Weapon (NGSW)

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures			
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
EP7: Aviation Airborne Expendable Countermeasures	-	0.000	4.920	4.476	-	4.476	8.241	0.000	0.000	0.000	0.000	17.637
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Aviation Airborne Expendable Countermeasures (AAECM) will support Integrated System Design (ISD), System Capability (SC) and Manufacturing Process Demonstrations (MPD) on current pyrotechnic munitions and tunable pyrotechnic aircraft countermeasures and decoys to include the XM215 Flare and Radio Frequency (RF) expendables. These expendable countermeasures systems are an essential part of survivability equipment for Army aircraft. Army Research Development Technology & Evaluation (RDT&E) efforts are coordinated with Program Executive Office (PEO) Aviation to address the AAECM capability, a critical enabler for the Future Vertical Lift (FVL) - Aircraft Survivability Equipment (ASE) Cross Functional Team (CFT) within Army's Top modernization priorities.

These advanced decoys will address deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. The project will also support ISD, SC and MPD on new expendable countermeasure munitions that will protect Army aircraft from advanced and current guided missile threats. Activities include modeling and simulation, flight testing, qualification testing, environmental considerations, safety enhancements, manufacturing enhancements, qualification of other service and foreign munitions that could meet current requirements, product improvements, insertion of new technologies to increase performance, and enhancement of current flare solutions for new and existing aircraft. Systems include impulse cartridges and aircraft expendables (to include RF expendables). Fiscal Year (FY) 2021 will support continued modeling and simulation and developmental testing for RF countermeasures and verification testing for the XM215 design.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Improvements to countermeasure flares	-	4.697	4.476	-	4.476
Description: This program will develop improvements to legacy countermeasure flare solutions and qualify them for Army use.					
FY 2020 Plans: Continued data analysis and evaluation of prototypes and flight effectiveness testing on Army platforms based on modeling and simulation (M&S) results. Down select potential solutions to transition to the Engineering and Manufacturing Development (EMD) Phase for XM215 and RF Passive countermeasure solutions.					
FY 2021 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Continue M&S of RF Passive countermeasure solutions, build prototypes, and conduct Developmental Test and Evaluation (DT&E). Refine XM215 design, conduct design verification and flight testing. FY 2020 to FY 2021 Increase/Decrease Statement: Funding change from FY 2020 to FY 2021 reflects decrease in prototype development as potential solutions are refined. Final prototypes will be identified and refined resulting in lower product development costs, which is reflected in the decreased FY 2021 funding.					
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC 638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638	-	0.223	-	-	-
Accomplishments/Planned Programs Subtotals	-	4.920	4.476	-	4.476

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
• EB9: Aviation Airborne Expendable Countermeasures	5.004	3.186	4.496	-	4.496	6.054	-	-	-	0.000	18.740

Remarks

D. Acquisition Strategy
A Technical Development Strategy (TDS) for the development and production of Flare, Aircraft: Countermeasure XM215 and RF Decoys under the AAECM program for the United States (U.S.) Army will be used. Prototyping contracts will be awarded competitively under the Department of Defense (DoD) Ordnance Technology Consortium (DOTC) Section 845 Other Transaction Authority (OTA) contract mechanism. Following Milestone B, EMD activities will include continued design development, flight testing, design verification review, and developmental and operational testing ahead of Milestone C.

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP7 / Aviation Airborne Expendable Countermeasures								
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	-	-		0.223		-		-		-	0.000	0.223	-	
Subtotal			-	-		0.223		-		-		-	0.000	0.223	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	
XM215 Development	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	-	-		2.515	Jan 2020	0.750	Oct 2020	-		0.750	0.000	3.265	-	
RF Development	C/FFP	DOTC : PICATINNY ARSENAL	-	-		-		0.500	Oct 2020	-		0.500	0.000	0.500	-	
Subtotal			-	-		2.515		1.250		-		1.250	0.000	3.765	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	
XM215 Engineering Support	MIPR	CCDC : Picatinny Arsenal	-	-		0.744	Dec 2019	0.741	Dec 2020	-		0.741	0.000	1.485	-	
RF Engineering Support	MIPR	CCDC : Picatinny Arsenal	-	-		0.194	Dec 2019	0.782	Dec 2020	-		0.782	0.000	0.976	-	
Subtotal			-	-		0.938		1.523		-		1.523	0.000	2.461	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	
XM215 Flight Testing	MIPR	AED : Redstone Arsenal, AL	-	-		1.244	Jun 2020	1.403	Oct 2020	-		1.403	0.000	2.647	-	

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures

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												
XM215 Development																																								
XM215 Milestone A	1																																							
	XM215 MS-A																																							
XM215 Prototyping																																								
					XM215 Prototyping																																			
XM215 Down Select					3																																			
					XM215 DS																																			
XM215 Testing Efforts (Stability/Heat/Cold)																																								
					XM215 Testing																																			
XM215 Flight Testing																																								
					XM215 Flight Test																																			
XM215 Milestone B					4																																			
					XM215 MS-B																																			
XM215 Development Contract																																								
					XM215 EMD																																			
XM215 Design Verification Test																																								
									XM215 DVT																															
XM215 Flight Test																																								
									XM215 Flight Test																															
XM215 Developmental and Operational Testing																																								
													XM215 DT/OT																											
XM215 Milestone C																	8																							
																	XM215 MS-C																							
RFCM Development																																								

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures

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
RFCM Milestone A	▲ RFCM MS-A																											
RFCM Prototype Development	■ RFCM Prototyping																											
RFCM Demonstrations	■ RFCM Demos																											
RFCM Flight Testing 1	■ RFCM Flight Test																											
RFCM Data Analysis	■ RFCM MS-B Prep																											
RFCM Milestone B					▲ RFCM MS-B																							
RFCM Development Contract					■ RFCM EMD																							
RFCM Qualification Build									■ RFCM Qual Build																			
RFCM Critical Design Review									▲ RFCM CDR																			
RFCM Production Qualification Testing									■ RFCM PQT																			
RFCM Developmental Test and Evaluation													■ RFCM T&E															
RFCM Milestone C																	▲ RFCM MS-C											

Note
Project EB9 / Aviation Airborne Expendable Countermeasures within PE 0603639A / Tank and Medium Caliber Ammunitions transitions to Engineering and Manufacturing Development (EMD) under Project EP7 / Aviation Airborne Expendable Countermeasures within PE 0604802A / Weapons and Munitions - Eng Dev.

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP7 / <i>Aviation Airborne Expendable Countermeasures</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
XM215 Development	1	2019	4	2025
XM215 Milestone A	1	2019	1	2019
XM215 Prototyping	1	2019	2	2020
XM215 Down Select	3	2019	3	2019
XM215 Testing Efforts (Stability/Heat/Cold)	3	2019	2	2020
XM215 Flight Testing	1	2020	2	2020
XM215 Milestone B	2	2020	2	2020
XM215 Development Contract	2	2020	4	2022
XM215 Design Verification Test	2	2021	3	2021
XM215 Flight Test	3	2021	4	2021
XM215 Developmental and Operational Testing	2	2022	4	2022
XM215 Milestone C	2	2023	2	2023
RFCM Development	1	2019	4	2025
RFCM Milestone A	1	2019	1	2019
RFCM Prototype Development	1	2019	4	2019
RFCM Demonstrations	2	2019	3	2019
RFCM Flight Testing 1	4	2019	4	2019
RFCM Data Analysis	4	2019	3	2020
RFCM Milestone B	3	2020	3	2020
RFCM Development Contract	3	2020	1	2022
RFCM Qualification Build	1	2021	2	2021
RFCM Critical Design Review	2	2021	2	2021

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures
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Events	Start		End	
	Quarter	Year	Quarter	Year
RFCM Production Qualification Testing	2	2021	3	2021
RFCM Developmental Test and Evaluation	3	2021	4	2021
RFCM Milestone C	1	2022	1	2022

Note

Project EB9 Aviation Airborne Expendable Countermeasures within Program Element (PE) 0603639A Tank and Medium Caliber Ammunitions transitions to EMD under Project EP7 Aviation Airborne Expendable Countermeasures within PE 0604802A Weapons and Munitions - Eng Dev.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EU4 / 40mm HV Improved High Explosive Dual Purpose			
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
EU4: 40mm HV Improved High Explosive Dual Purpose	-	6.937	13.055	8.351	-	8.351	2.311	0.000	0.000	0.000	0.000	30.654
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

40 millimeter (mm) High Velocity (HV) High Explosive Dual Purpose - Airburst (HEDP-AB) is a new capability identified in the 40mm High Velocity Improved High Explosive Dual Purpose Cartridge Capability Development Document (CDD) and will provide the Mk19 Mod 3 Grenade Machine Gun (GMG) an airburst capable cartridge with the ability of achieving required lethal effects against enemy targets in the open and in defilade while maintaining the capability to defeat unarmored and lightly armored vehicles. Fiscal Year (FY) 2021 funding supports continuing Engineering and Manufacturing Development (EMD) activities including Developmental Test & Evaluation (DT&E), Soldier Touch Point (STP), Family of Weapon Sights - Crew Served (FWS-CS) and Common Remote Operating Weapons System (CROWS) Integration.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: EMD</p> <p>Description: Award EMD contracts to support Design Engineering Testing (DET) and DT&E of the 40mm dual purpose airburst capability.</p> <p>FY 2020 Plans: FY 2020 funding supported EMD activities including DET 1, DET 2, STP and FWS-CS Integration.</p> <p>FY 2021 Base Plans: FY 2021 funding will support continuing EMD activities including DT&E, STP, FWS-CS and CROWS Integration.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Program decrease based on level of effort for continued contractor development, DET and STP.</p>	6.937	12.463	8.351	-	8.351
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	-	0.592	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU4 I 40mm HV Improved High Explosive Dual Purpose

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	6.937	13.055	8.351	-	8.351

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
• E70505: CTG, 40mm HV GMG, I-HEDP	-	-	0.000	-	0.000	15.206	17.517	-	-	0.000	32.723

Remarks

D. Acquisition Strategy

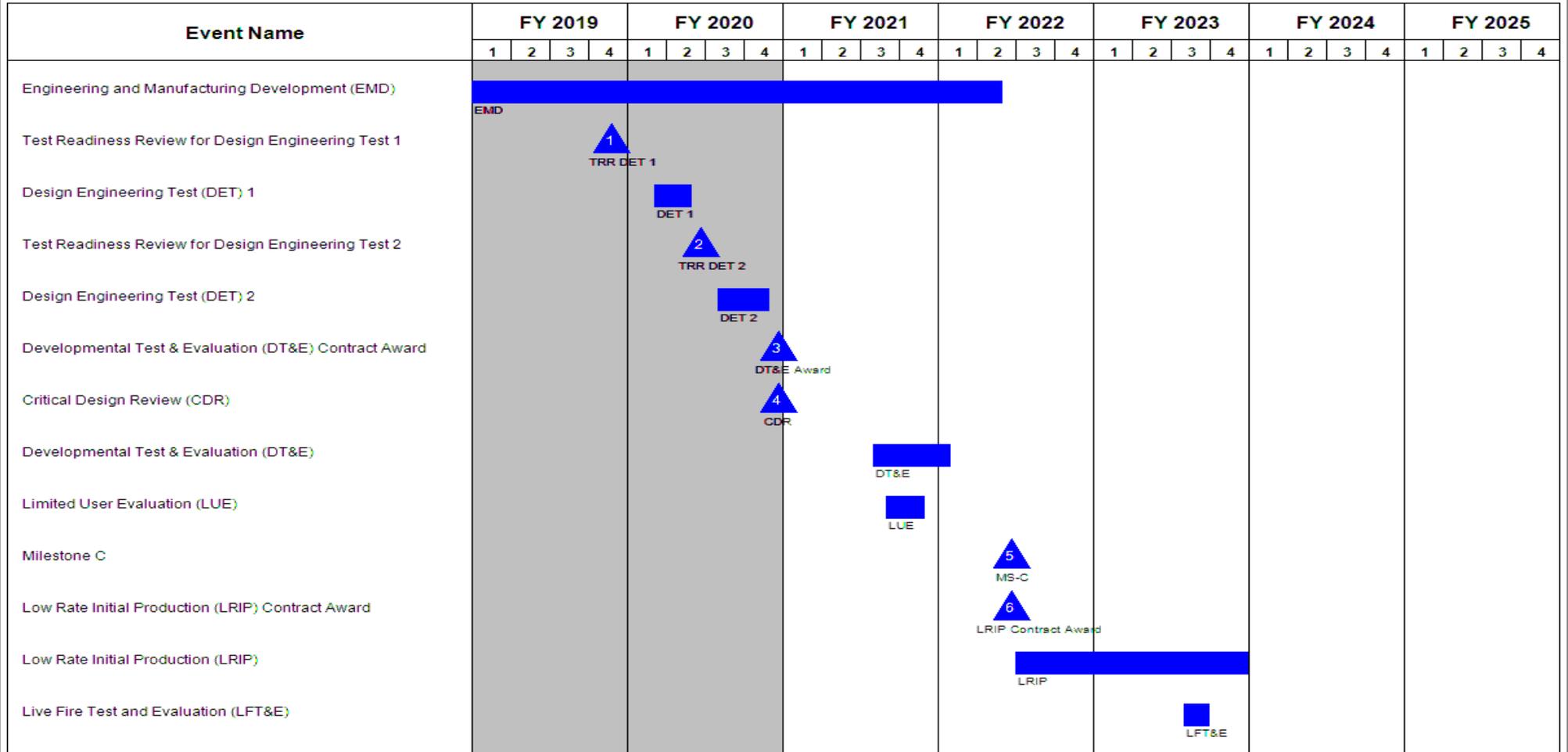
The 40mm HV HEDP-AB cartridge will be developed through a competitive EMD program. Milestone B approval was followed by a competitive award for the EMD phase which included DET 1 and DET 2 to enter into DT&E. One contractor was awarded to develop an airburst capable fuze to be retrofitted onto the currently fielded, High Explosive Point Detonating cartridges and develop a Programming Unit. Test results will support the documentation for Milestone C. After Milestone C is achieved, a contract will be awarded for Low Rate Initial Production (LRIP) followed by two options.

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EU4 I 40mm HV Improved High Explosive Dual Purpose							
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	-	-		0.592		-		-		-	0.000	0.592	-
Subtotal			-	-		0.592		-		-		-	0.000	0.592	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
Project Manager Maneuver Ammunition Systems (PM MAS)	MIPR	Picatiny Arsenal : NJ	0.242	0.300	Jan 2019	-		-		-		-	0.000	0.542	-
Engineering and Manufacturing Development (EMD) Contract DET 1 & 2	C/CPFF	Rheinmatell, Day & Zimmermann Munitions : Rosslyn, Va.	-	4.858	Jul 2019	4.430	Oct 2019	2.805	Dec 2020	-		2.805	Continuing	Continuing	Continuing
Engineering and Manufacturing Development (EMD) Contract DT&E	C/CPFF	Rheinmatell, Day & Zimmermann Munitions : Rosslyn, Va.	-	-		4.430	Oct 2019	-		-		-	Continuing	Continuing	Continuing
Subtotal			0.242	5.158		8.860		2.805		-		2.805	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
Engineering Support	MIPR	Combat Capabilities Development Command - Armaments Center (CCDC-AC) : Picatinny Arsenal, NJ	2.153	1.457	Oct 2018	1.880	Oct 2019	2.208	Oct 2020	-		2.208	Continuing	Continuing	Continuing
Subtotal			2.153	1.457		1.880		2.208		-		2.208	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU4 / 40mm HV Improved High Explosive Dual Purpose



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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU4 I 40mm HV Improved High Explosive Dual Purpose

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone B Support Documents	2	2017	4	2018
Milestone B	4	2018	4	2018
Engineering and Manufacturing Development (EMD)	4	2018	2	2022
Test Readiness Review for Design Engineering Test 1	4	2019	4	2019
Design Engineering Test (DET) 1	1	2020	2	2020
Test Readiness Review for Design Engineering Test 2	2	2020	2	2020
Design Engineering Test (DET) 2	3	2020	4	2020
Developmental Test & Evaluation (DT&E) Contract Award	4	2020	4	2020
Critical Design Review (CDR)	4	2020	4	2020
Developmental Test & Evaluation (DT&E)	3	2021	1	2022
Limited User Evaluation (LUE)	3	2021	4	2021
Milestone C	2	2022	2	2022
Low Rate Initial Production (LRIP) Contract Award	2	2022	2	2022
Low Rate Initial Production (LRIP)	3	2022	4	2023
Live Fire Test and Evaluation (LFT&E)	3	2023	3	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev					Project (Number/Name) EU5 / .50 Caliber All-Purpose Tactical cartridge (APTC)		
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
EU5: .50 Caliber All-Purpose Tactical cartridge (APTC)	-	0.000	0.000	8.491	-	8.491	9.390	0.000	0.000	11.989	0.000	29.870
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project EU5 .50 Caliber All-Purpose Tactical Cartridge (APTC) transitions from Budget Activity (BA) 4 Program Element (PE) 0603639A Tank and Medium Caliber Ammunition Project EU3 .50 Caliber APTC.

A. Mission Description and Budget Item Justification

The APTC project is a critical technology development in response to the .50 caliber Munitions Capabilities Development Documents (CDD). The overall objective of All-Purpose Tactical Cartridge is to deliver Ball and Tracer ammunition that replaces and improves current legacy .50 caliber ammunition. The All-Purpose Tactical Cartridge will be compatible with all Army .50 caliber weapons but specifically optimized to work in the M2 Machine Guns. Fiscal Year (FY) 2021 funding supports Engineering and Manufacturing Development (EMD), Milestone B (MS-B) accomplishment, conducting Design Verification Tests (DVT), and performing Pre-Production Qualification Tests (PPQT).

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: .50 Cal All-Purpose Tactical Cartridge EMD	-	-	8.491	-	8.491
Description: EMD Activities for the development of the .50 Caliber All-Purpose Tactical Cartridge APTC.					
FY 2021 Base Plans: Will achieve Milestone B (MS-B), award two competing EMD contracts to two contractors, conduct DVT on the competing concepts, and perform PPQT on the competing concepts.					
FY 2020 to FY 2021 Increase/Decrease Statement: Project EU5 .50 Caliber All-Purpose Tactical Cartridge (APTC) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project EU3 .50 Caliber APTC.					
Accomplishments/Planned Programs Subtotals	-	-	8.491	-	8.491

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU5 / .50 Caliber All-Purpose Tactical cartridge (APTC)
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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>
• EU3: .50 Caliber All-Purpose Tactical Cartridge (APTC)	-	4.250	0.000	-	0.000	-	-	-	-	0.000	4.250

Remarks

The effort under BA4, PE 0603639A, Project EU3, .50 Caliber APTC, starts the technology maturation of the .50 Caliber APTC in FY 2020. The effort transitions in FY 2021 to BA5, PE 0604802A, Project EU5. PE 0604802A, Project EU5 .50 Caliber APTC to continue the development work and support EMD beginning in FY 2021.

D. Acquisition Strategy

Evaluate competing concepts/prototypes from contractors and Government. In FY 2021, the Government intends to select up to two competing contractors to begin Engineering and Manufacturing Development (EMD). In FY 2022, the Government intends to select a single contractor to complete final qualification and testing in preparation for the transition to production in FY 2023.

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EU5 I .50 Caliber All-Purpose Tactical cartridge (APTC)							
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
Development Contract # 1	Option/CPFF	To be determined : To be determined	-	-		-		2.700	Jan 2021	-		2.700	Continuing	Continuing	-
Development Contract # 2	Option/CPFF	To be determined : To be determined	-	-		-		2.700	Jan 2021	-		2.700	Continuing	Continuing	-
Subtotal			-	-		-		5.400		-		5.400	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
Combat Capabilities Development Command, Armaments Center (CCDC, AC) Support	MIPR	Picatinny Arsenal : New Jersey	-	-		-		0.741	Oct 2020	-		0.741	Continuing	Continuing	Continuing
Combat Capabilities Development Command (CCDC) Army Research Lab (ARL)	MIPR	CCDC Army Research Lab (ARL) : Aberdeen, Maryland	-	-		-		1.500	Oct 2020	-		1.500	Continuing	Continuing	Continuing
Subtotal			-	-		-		2.241		-		2.241	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
Pre-Production Qualification Testing	MIPR	US Army Test Center (ATC) : Aberdeen, Maryland	-	-		-		0.500	Oct 2020	-		0.500	Continuing	Continuing	Continuing
Design Verification Testing	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		-		0.350	Oct 2020	-		0.350	Continuing	Continuing	Continuing
Subtotal			-	-		-		0.850		-		0.850	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU5 / .50 Caliber All-Purpose Tactical cartridge (APTC)

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	
APTC Materiel Development Decision (MDD)				▲ 1 APTC MDD																									
APTC Concept & Prototype Development					■ APTC Concept & Prototype Development																								
APTC Design Verification Test (DVT) 1					■ APTC DTV 1																								
APTC Preliminary Design Review (PDR)								▲ 2 APTC PDR																					
APTC Milestone B									▲ 3 APTC MS-B																				
APTC Transitions from BA04 EU3 to BA05 EU5									▲ 4 APTC BA04 to BA05 Transition																				
APTC Engineering & Manufacturing Development (EMD)									■ APTC EMD																				
APTC Design Verification Test (DVT) 2									■ APTC DVT 2																				
APTC Pre-Production Qualification Testing (PPQT)													■ APTC PPQT																
APTC Critical Design Review (CDR)																	▲ 5 APTC CDR												
APTC Production Qualification Testing (PQT)																					■ APTC PQT								
APTC Milestone C (MS-C)																									▲ 6 APTC MS-C				

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EU5 / <i>.50 Caliber All-Purpose Tactical cartridge (APTC)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
APTC Materiel Development Decision (MDD)	1	2020	1	2020
APTC Concept & Prototype Development	1	2020	1	2021
APTC Design Verification Test (DVT) 1	2	2020	3	2020
APTC Preliminary Design Review (PDR)	4	2020	4	2020
APTC Milestone B	1	2021	1	2021
APTC Transitions from BA04 EU3 to BA05 EU5	1	2021	1	2021
APTC Engineering & Manufacturing Development (EMD)	2	2021	4	2022
APTC Design Verification Test (DVT) 2	2	2021	3	2021
APTC Pre-Production Qualification Testing (PPQT)	4	2021	4	2021
APTC Critical Design Review (CDR)	2	2022	2	2022
APTC Production Qualification Testing (PQT)	3	2022	4	2022
APTC Milestone C (MS-C)	1	2023	1	2023

Note

Note:
All-Purpose Tactical Cartridge (APTC)

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range			
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
EU6: 155mm HE Rocket Assist Project Extended Range	-	37.565	18.943	31.236	-	31.236	2.997	2.997	0.000	0.000	0.000	93.738
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The 155 millimeter (mm) High Explosive (HE) Rocket Assisted Projectile, Extended Range Project supports the development of materiel solutions to meet the Army's long range precision fires modernization strategy. This Project supports projectile development efforts to achieve ranges of 40 kilometers (km) in current artillery weapon systems (39 caliber tube length) and characterize longer ranges in future artillery weapon systems (58 caliber tube length Extended Range Cannon Artillery, (ERCA). These efforts will leverage enhanced lethality cannon munition technologies to compensate for increased rocket motor volume. The projectile body will be filled with an insensitive munition (IM) HE and a supplementary charge to improve soldier survivability. Fiscal Year (FY) 2021 funding supports the Urgent Materiel Release (UMR) activities of XM1113 including fire control software integration and development and qualification testing for current artillery systems. FY 2021 funding will also support the continuation of characterization activities required for a projectile concept compatible with the ERCA weapon systems to achieve the Army's requirement of extended range lethality with precision accuracy by FY 2023.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: 155mm High Explosive Rocket Assist Project (RAP) Extended Range	37.565	18.536	31.236	-	31.236
Description: Evaluate, Develop, and Qualify Extended Range Technologies.					
FY 2020 Plans: FY 2020 funding supported the XM1113 qualification, fuze performance evaluation and confirmation for Urgent Materiel Release (UMR) in FY 2021, as well as provided the continued engineering efforts of the XM1113 maturation in support of a Milestone C. FY 2020 funding also supported the initiation of characterization activities for 58 caliber weapon systems; such as, Precision Guidance-Aft, to achieve the Army's requirement of longer range lethality with precision accuracy in FY 2023.					
FY 2021 Base Plans: FY 2021 funding supports the UMR activities of XM1113 including fire control software integration and development and qualification testing for current artillery systems. FY 2021 funding will also support the continuation of characterization activities required for a projectile concept compatible with the ERCA weapon systems to achieve the Army's requirement of extended range lethality with precision accuracy by FY 2023.					
FY 2020 to FY 2021 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Increase in funding from FY 2020 to FY 2021 in order to achieve the Army's requirement of 70km with precision accuracy by FY 2023.					
Title: FY 2020 SBIR/STTR Transfer	-	0.407	-	-	-
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	37.565	18.943	31.236	-	31.236

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>
• E66501: PROJ, 155mm ARTY HE RAP, XM1113	-	20.000	26.972	-	26.972	51.647	52.588	54.466	55.405	0.000	261.078

Remarks

D. Acquisition Strategy
The 155mm HE Rocket Assisted Projectile, Extended Range Project is utilizing a single DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiative with GD-OTS to support the accelerated timeline and UMR of 2,000 projectiles for 39 caliber weapon systems, and will achieve lethality against targets at 40km range. DOTC OTA initiatives are also being utilized for projectile characterization of the XM1113 for the 58 caliber weapon systems, Extended Range Cannon Artillery (ERCA) Increments 1C and 2, for Full Materiel Release (FMR). The Program will transition to a Federal Acquisition Regulation (FAR) based production contract after Milestone C for Low Rate Initial Production (LRIP) and Full Rate Production (FRP).

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	0.190	Oct 2018	0.048	Oct 2019	0.150	Oct 2020	-		0.150	0.000	0.388	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.407		-		-		-	0.000	0.407	-
Subtotal			-	0.190		0.455		0.150		-		0.150	0.000	0.795	N/A

Remarks
Program Management support includes travel and milestone documentation support.

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Prototype Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : G-DOTS	-	27.223	Nov 2018	12.587	Nov 2019	16.125	Nov 2020	-		16.125	17.000	72.935	-
Subtotal			-	27.223		12.587		16.125		-		16.125	17.000	72.935	N/A

Remarks
Additional funding required for prototype hardware to support the Urgent Materiel Release (UMR) for 39 caliber systems as well as the development activities for 58 caliber weapon systems.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering Support	MIPR	Combat Capabilities Development Command	-	5.204	Oct 2018	3.148	Mar 2020	4.761	Oct 2020	-		4.761	11.400	24.513	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
		Armaments Center (CCDC AC) : Picatinny Arsenal, NJ													
Fire Control Software Integration	MIPR	U.S. Army Communications-Electronics Command (CECOM) : Aberdeen, MD	-	0.362	Sep 2019	-		2.000	Mar 2021	-		2.000	0.000	2.362	-
Subtotal			-	5.566		3.148		6.761		-		6.761	11.400	26.875	N/A

Remarks
Additional funding required for engineering support and fire control software integration to support both the Urgent Materiel Release (UMR) for 39 caliber systems as well as the development activities for 58 caliber weapon systems.

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			
Testing	MIPR	Army Research Lab (ARL) : Adelphi, MD	-	0.600	Jan 2019	-		-		-		-	0.000	0.600	-
Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	-	2.286	Mar 2019	2.753	Mar 2020	3.200	Mar 2021	-		3.200	9.500	17.739	-
Testing	MIPR	Army Test and Evaluation Command (ATEC) Aberdeen Proving Ground (APG) : Aberdeen, MD	-	1.700	Jul 2019	-		4.500	Mar 2021	-		4.500	0.000	6.200	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range
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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			
Testing	MIPR	National Technical Systems (NTS) : Camden, AR	-	-		-		0.500	Mar 2021	-		0.500	0.000	0.500	-
Subtotal			-	4.586		2.753		8.200		-		8.200	9.500	25.039	N/A

Remarks
Additional funding required for test and evaluation activities to support both the Urgent Materiel Release (UMR) for 39 caliber systems as well as the development activities for 58 caliber weapon systems.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	37.565	18.943	31.236	-	31.236	37.900	125.644	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
XM1113 High Explosive Rocket Assisted Projectile	1	2019	4	2023
Lethality Testing	1	2019	1	2020
Materiel Development Decision (MDD)	4	2019	4	2019
XM1113 HE RAP Engineering Manufacturing Development (EMD)	4	2019	4	2022
39 cal Qualification	4	2019	4	2021
39 cal Urgent Materiel Release (UMR)	4	2021	4	2021
39 cal Milestone C	4	2022	4	2022
39 cal Full Materiel Release (FMR)	4	2023	4	2023
58 cal Characterization	4	2021	4	2023
58 cal Knowledge Point (KP)	4	2023	4	2023
XM1113E1 HE RAP Extended Range	3	2021	4	2023
XM1113E1 HE RAP Extended Range EMD	2	2020	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions			
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
EU7: Enhanced Lethality Cannon Munitions	-	10.915	7.908	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	18.823
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project EU7 Enhanced Lethality Cannon Munitions transitions to Procurement.

A. Mission Description and Budget Item Justification

The Enhanced Lethality Cannon Munitions (ELCM) Project will evaluate, develop, and qualify new lethality technologies for 155 millimeter (mm) cannon artillery munitions and evaluate their effectiveness in mitigating evolving and derived capability gaps, and support transition to production. The ELCM Project supports testing and assessment of the Israeli Military Industries (IMI) Systems M999 advanced anti-personnel munition in support the Army Directed Requirement for a Rapid Bridging Solution for the replacement of the 155mm Dual Purpose Improved Conventional Munition (DPICM). This Project also accelerates the qualification of the 155mm XM1128 High Explosive Projectile, which will replace the M795 Critical Munition once qualified. Engineering efforts are ongoing and will support the evaluation of the XM1128 test data to determine that the Program is safe, suitable and operationally effective, as well as the gathering of all statutory and regulatory requirements in support of a Milestone C in FY 2021. In Fiscal Year (FY) 2021, this Project does not have an Research Development Technology & Evaluation (RDT&E) request.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: 155mm XM1128 High Explosive Projectile	10.915	7.549	-	-	-
Description: Evaluate, Develop, and Qualify Enhanced Lethality Technologies.					
FY 2020 Plans: FY 2020 funds supported fuze performance evaluation and confirmation with XM1128, as well as continued Insensitive Munitions (IM) testing, Sequential Environmental Test - Safety (SET-S), and Military Standard environmental testing (MIL-STD-810). Engineering efforts supported the evaluation of the XM1128 test data to determine that the Program is safe, suitable and operationally effective, as well as the gathering of all statutory and regulatory requirements in support of a Milestone C in FY 2021.					
FY 2020 to FY 2021 Increase/Decrease Statement: Project EU7 Enhanced Lethality Cannon Munitions transitions to Procurement.					
Title: FY 2020 SBIR/STTR Transfer	-	0.359	-	-	-
Description: Funding transferred in accordance with Title 15 USC 638					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<i>FY 2020 Plans:</i> Funding transferred in accordance with Title 15 USC 638					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	10.915	7.908	-	-	-

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>
• E67802: PROJ, 155mm ARTY HE-BB, XM1128	-	14.994	0.000	-	0.000	50.189	119.663	125.707	126.241	0.000	436.794

Remarks
 In FY 2020, XM1128 is transitioning to production. A Procurement of Ammunition, Army (PAA) funding line, Standard Study Number (SSN) E67802, PROJ, 155mm ARTY HE-BB, XM1128, has been established.

D. Acquisition Strategy
 The XM1128 High Explosive munition has been accelerated for qualification, per the Army Directed Requirement for a Rapid Bridging Solution for the 155mm DPICM as of 22 December 2016, as an inherent part of the Rapid Bridging solution for 155mm DPICM. Prototyping was awarded in 1st Quarter (1Q) FY 2018 through Department of Defense (DoD) Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiatives to multiple vendors (subcontractors to United States (U.S.) Government system integrator) through Engineering & Manufacturing Development (EMD). The U.S. Government will lead EMD efforts to complete development by end 4Q FY 2020. Milestone C approval is in 2Q FY 2021. Following Milestone C, the XM1128 will be competed via Federal Acquisition Regulation (FAR) based contracts for Load, Assemble, and Pack (LAP) and metal parts in support of Low Rate Initial Production (LRIP) and follow-on production activities. Full Material Release (FMR) is planned for 1Q FY 2022.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Enhanced Lethality Cannon Munitions (ELCM) Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	0.347	0.140	Oct 2018	0.060	Oct 2019	-		-		-	0.000	0.547	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.359		-		-		-	0.000	0.359	-
Subtotal			0.347	0.140		0.419		-		-		-	0.000	0.906	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
XM1128 Prototype Qualification Tests (PQT) Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	10.074	3.304	Feb 2019	4.139	Dec 2019	-		-		-	0.140	17.657	-
XM1113 Prototype Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	4.494	-		-		-		-		-	0.000	4.494	-
Subtotal			14.568	3.304		4.139		-		-		-	0.140	22.151	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
XM1128 Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	5.294	2.132	Mar 2019	1.940	Mar 2020	-		-		-	1.377	10.743	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
XM1128 Firing Table Software Updates	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Adelphi, MD	2.123	-		-		-		-		-	0.000	2.123	-
M999 Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	0.750	-		-		-		-		-	0.000	0.750	-
XM1113 Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	0.606	-		-		-		-		-	0.000	0.606	-
Subtotal			8.773	2.132		1.940		-		-		-	1.377	14.222	N/A

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			
XM1128 Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	-	3.089	Mar 2019	1.410	Mar 2020	-		-		-	0.000	4.499	-
XM1128 Testing	MIPR	Naval Surface Warfare Center (NSWC) ? Dahlgren : Dahlgren, VA	-	1.500	Nov 2018	-		-		-		-	0.000	1.500	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions

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				
XM1128																																
XM1128 Prototyping	[Bar]																															
	XM1128 Prototyping																															
XM1128 Lethality Testing and Assessment	[Bar]																															
	XM1128 Lethality Testing and Assessment																															
XM1128 Critical Design Review (CDR)	▲ 1 XM1128 CDR																															
XM1128 Performance Qualification Testing (PQT)	[Bar]																															
	XM1128 PQT																															
XM1128 Baseline Prototyping					[Bar]																											
					XM1128 Baseline Prototyping																											
XM1128 Milestone C									▲ 2 XM1128 MS-C																							
XM1128 Full Materiel Release (FMR)																	▲ 3 XM1128 FMR															
M999																																
M999 Testing	[Bar]																															
	M999 Testing																															

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
XM1128	3	2017	1	2021
XM1128 Prototyping	3	2017	4	2019
XM1128 Milestone B	1	2018	1	2018
XM1128 Lethality Testing and Assessment	4	2017	4	2019
XM1128 Critical Design Review (CDR)	2	2019	2	2019
XM1128 Performance Qualification Testing (PQT)	2	2019	3	2020
XM1128 Baseline Prototyping	4	2019	3	2020
XM1128 Milestone C	2	2021	2	2021
XM1128 Full Materiel Release (FMR)	1	2023	1	2023
M999	4	2018	4	2019
M999 Testing	4	2018	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EU8 / Improved Multi-Option Fuze			
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
EU8: Improved Multi-Option Fuze	-	7.615	10.000	7.992	-	7.992	4.995	0.000	0.000	0.000	0.000	30.602
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Improved Multi-Option Fuze Project is a technology refresh and modernization effort that provides an incremental capability with technology advancements and performance improvements on the current non-precision artillery and mortar ammunition proximity multi-option fuze that will increase robustness to electronic countermeasures (ECM), eliminates the susceptibility of reverse engineering (RE), incorporates power source advancements, improves delay mode reliability, and integrates safe & arm improvements. This Project will develop and qualify safe, affordable, reliable, Proximity Height of Burst fuzing solutions with robust Defense Exportability Features (DEF) for non-precision conventional cannon artillery and mortar munitions that are resistant to adversary exploitation via ECM and RE threats. Fiscal Year (FY) 2021 funds will support Improved Multi-Option Fuze Mortar (iMOFM) design verification, hardware fabrication, qualification testing, and Fuze Qualification Testing for both Multi-Option Fuze Artillery (MOFA) II and iMOFM.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Improved Multi-Option Fuze Development	7.615	9.546	7.992	-	7.992
Description: Develop and qualify improved multi-option fuze technologies.					
FY 2020 Plans: FY 2020 funding supported the Engineering and Manufacturing Development (EMD) contract increments utilizing the Department of Defense Ordinance Technology Center (DOTC) Other Transaction Agreement (OTA) for MOFA II detailed designs, the fabrication of hardware and the execution of MOFA II Product Qualification Tests (PQT), ballistic engineering and qualification testing, iMOFM developmental verification tests, iMOFM Critical Design Review, the execution of iMOFM PQT and the preparations for transition into production.					
FY 2021 Base Plans: FY 2021 funds will support iMOFM design verification, hardware fabrication, qualification testing, and Fuze Qualification Testing for both MOFA II and iMOFM.					
FY 2020 to FY 2021 Increase/Decrease Statement: Decrease from FY 2020 to FY 2021 due to the reduction in contract costs associated with the design and fabrication of MOFA II and iMOFM hardware to support PQT.					
Title: FY 2020 SBIR/STTR Transfer	-	0.454	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	7.615	10.000	7.992	-	7.992

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
• E99909: Multi-Option Fuze, Artillery M782	-	-	7.576	-	7.576	8.697	6.810	8.889	7.829	0.000	39.801

Remarks
In FY 2022, MOFA II will transition to production. Procurement of Ammunition, Army (PAA) funding will be executed on Standard Study Number (SSN) E99909, Multi-Option Fuze, Artillery M782.

D. Acquisition Strategy
The Improved Multi-Option Fuze Project will utilize the DOTC OTA with incrementally funded EMD contracts for improved and modernized MOFA II detailed designs and the fabrication of hardware. The Improved Multi-Option Fuze Project will enhance the existing multi-option fuzes for cannon artillery and mortar munitions programs of record. Detailed government-owned Technical Data Packages (TDPs) will enable "build to print" designs to facilitate competitive Federal Acquisition Regulation (FAR) based contracting for procurement. Qualified MOFA II will be a Technology Readiness Level 8 (TRL-8) TC design with a mature technical design packages for production. Parallel iMOFM effort will be a qualified TRL-8 design for incorporation into mortar cartridge production.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	0.898	0.135	Nov 2018	-		-		-		-	0.000	1.033	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.454		-		-		-	0.000	0.454	-
Subtotal			0.898	0.135		0.454		-		-		-	0.000	1.487	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MOFA II Development & PQT Support	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	5.395	Apr 2019	5.263	Dec 2019	-		-		-	0.000	10.658	-
iMOFM Fuze Test Hardware & Qualification	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	0.595	Jun 2019	1.959	Mar 2020	2.000	Jan 2021	-		2.000	0.000	4.554	-
Subtotal			-	5.990		7.222		2.000		-		2.000	0.000	15.212	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	1.551	1.125	Nov 2018	1.024	Nov 2019	2.992	Nov 2020	-		2.992	0.000	6.692	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Engineering Support	C/LH	SAVIT Corporation : Rockaway, NJ	-	-		-		0.300	Mar 2021	-		0.300	0.000	0.300	-
Subtotal			1.551	1.125		1.024		3.292		-		3.292	0.000	6.992	N/A

Remarks
 There is a significant increase in Engineering Support due to additional support required for qualification testing, test plans, and test reports. In addition, coordination and funding of multiple offices is required to obtain the required documentation for a Type Classification and Milestone C decision on Multi-Option Fuze Artillery (MOFA) II as well as an Engineering Change Proposal (ECP) on improved Multi-Option Fuze Mortar (iMOFM).

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			
Improved Multi-Option Fuze Test and Evaluations	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	-	-		-		0.200	Mar 2021	-		0.200	0.000	0.200	-
Improved Multi-Option Fuze Test and Evaluations	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	0.187	0.215	Jun 2019	0.952	Jun 2020	1.350	Mar 2021	-		1.350	0.000	2.704	-
Improved Multi-Option Fuze Test and Evaluations	MIPR	U.S. Army Research Lab (ARL) : Adelphi, MD	0.150	0.150	Nov 2018	0.024	Jan 2020	0.100	Dec 2020	-		0.100	0.000	0.424	-
Improved Multi-Option Fuze Test and Evaluations	MIPR	White Sands Missile Range (WSMR) : White Sands, NM	-	-		0.324	Jun 2020	0.700	Mar 2021	-		0.700	0.000	1.024	-
Improved Multi-Option Fuze Cyber Security Testing	MIPR	TBD : TBD	-	-		-		0.350	Mar 2021	-		0.350	0.000	0.350	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze
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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			
Subtotal			0.337	0.365		1.300		2.700		-		2.700	0.000	4.702	N/A

Remarks
Cyber Security testing for MOFA II is required during Fiscal Year (FY) 2021. The test location will be determined based on informed requirements by March 2021.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	2.786	7.615	10.000	7.992	-	7.992	0.000	28.393	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze

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
Fabricate Prototypes	[Redacted]																											
Conduct Evaluations and Design Reviews	[Redacted]																											
MOFA II																												
Fabricate MOFA II System Level Qualification Hardware					[Redacted]																							
MOFA II Safety, Reliability, Environmental, Qualification Testing									[Redacted]																			
MOFA II Milestone C													▲ 1 MS-C															
iMOFM																												
Fabricate iMOFM System Level Qualification Hardware					[Redacted]																							
iMOFM Qualification Testing									[Redacted]																			
iMOFM ECP													▲ 2 ECP															

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Fabricate Prototypes	3	2018	3	2019
Conduct Evaluations and Design Reviews	2	2019	4	2019
MOFA II	3	2019	4	2022
Fabricate MOFA II System Level Qualification Hardware	2	2020	3	2021
MOFA II Safety, Reliability, Environmental, Qualification Testing	1	2021	2	2022
MOFA II Milestone C	2	2022	2	2022
iMOFM	2	2020	4	2022
Fabricate iMOFM System Level Qualification Hardware	3	2020	3	2021
iMOFM Qualification Testing	4	2021	3	2022
iMOFM ECP	4	2022	4	2022

Note

Multi-Option Fuze Artillery (MOFA)
improved Multi-Option Mortar (iMOFM)
Engineering Change Proposal (ECP)

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EW1 / 40mm Low Velocity Ammunition			
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
EW1: 40mm Low Velocity Ammunition	-	8.467	14.032	22.479	-	22.479	5.958	1.998	0.000	0.000	0.000	52.934
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The 40 millimeter (mm) Low Velocity High Explosive Air Burst (HEAB) is a new capability identified as a Warfighter requirement in the Capability Development Document (CDD), 40mm Low Velocity (LV) Family of Ammunition Annex. The HEAB tactical cartridge allows the Warfighter to engage targets at increased effective ranges using the 40mm M320 Grenade Launcher. The HEAB cartridge provides the grenadier with a higher probability of achieving a first shot kill against enemy personnel, coupled with the ability to defeat personnel targets in defilade positions. When deployed against point and area targets, the cartridge inflicts incapacitating effects against personnel beyond those offered by the current M433 High Explosive Dual Purpose (HEDP) cartridge. The cartridge provides lethal effects against targets with improved accuracy and greater standoff ranges resulting in increased soldier survivability. Fiscal Year (FY) 2021 will support any remaining Design Engineering Test build; Soldier Touch Point (Limited User Evaluation), Critical Design Review, Test Readiness Reviews (TRRs) and Developmental Test and Evaluation (DT&E) build and test.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: 40mm LV HEAB, XM1166	8.467	13.395	22.479	-	22.479
Description: Engineering Manufacturing Development (EMD) of the 40mm LV HEAB munition.					
FY 2020 Plans: FY 2020 EMD activities included TRRs, Design Engineering Test (DET) hardware build, DET 2 testing, a Soldier Touch Point LUE and DET 3 hardware build.					
FY 2021 Base Plans: FY 2021 will support the remaining DET 3 build and test, Critical Design Review, TRRs and hardware build for Development Test and Evaluation.					
FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to increased level of effort supporting multiple test activities.					
Title: FY 2020 SBIR/STTR Transfer	-	0.637	-	-	-
Description: Funding transferred in accordance with Title 15 USC 638					
FY 2020 Plans:					

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding transferred in accordance with Title 15 USC 638					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i>					
Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	8.467	14.032	22.479	-	22.479

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>
• E71005: CTG, 40mm LV, IRAP	-	-	0.000	-	0.000	11.589	13.581	-	-	0.000	25.170

Remarks

D. Acquisition Strategy
 The HEAB cartridge will be developed through a competitive EMD program. Potential designs were evaluated as part of the pre-EMD activities using a Cooperative Research and Development Agreement (CRADA) with contractors. For EMD, the Government awarded two contracts utilizing an Other Transaction Agreement (OTA) through Department of Defense (DoD) Ordnance Technology Consortium (DOTC). The EMD phase will consist of a series of DETs to assess the Contractors' design progress and ability of achieving the program objectives. Any shortcomings and deficiencies will be addressed prior to final DT&E. After DT&E and a successful Milestone C, the Government will down-select to a single contractor for Low Rate Initial Production (LRIP) and four production year options utilizing a follow-on Federal Acquisition Regulation (FAR) based contract.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.637		-		-		-	0.000	0.637	-
Subtotal			-	-		0.637		-		-		-	0.000	0.637	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LV HEAB XM1166 Contractor 1	C/CPFF	Day & Zimmerman, Inc (DZI) : Middletown, IA	3.900	3.467	Jan 2019	5.557	Oct 2019	8.400	Jan 2021	-		8.400	Continuing	Continuing	Continuing
LV HEAB XM1166 Contractor 2	C/CPFF	Chemring Ordnance, Inc : Perry, FL	3.900	3.276	Jan 2019	5.557	Oct 2019	8.400	Jan 2021	-		8.400	Continuing	Continuing	Continuing
Subtotal			7.800	6.743		11.114		16.800		-		16.800	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LV HEAB XM1166 - Engineering Support	MIPR	Combat Capabilities Development Command - Armaments Center (CCDC-AC) : Picatinny Arsenal, NJ	1.250	1.064	Nov 2018	1.190	Oct 2019	1.479	Jan 2021	-		1.479	Continuing	Continuing	Continuing
Subtotal			1.250	1.064		1.190		1.479		-		1.479	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 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition
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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			
LV HEAB XM1166 Design Engineering Test (DET) 1	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	0.660	Oct 2019	-		-		-		-	0.000	0.660	-
LV HEAB XM1166 Design Engineering Test (DET) 2	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		1.091	Feb 2020	-		-		-	0.000	1.091	-
LV HEAB XM1166 Design Engineering Test (DET) 3	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		-		1.100	Jan 2021	-		1.100	0.000	1.100	-
LV HEAB XM1166 Developmental Test and Evaluation (DT&E)	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		-		3.100		-		3.100	0.000	3.100	-
Subtotal			-	0.660		1.091		4.200		-		4.200	0.000	5.951	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
Project Cost Totals	9.050	8.467	14.032	22.479	-	22.479	Continuing	Continuing	N/A

Remarks
Notes:
Low Velocity (LV)
High Explosive Air Burst (HEAB)

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition

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 HEAB XM1166 Engineering Manufacturing Development	[Redacted]																												
40mm HEAB XM1166 Preliminary Design Review	▲ 1 HEAB PDR																												
40mm HEAB XM1166 Design Engineering Test DET 1					■ HEAB DET 1																								
40mm Soldier Touch Point 1 (STP1)					■ STP1																								
40mm HEAB XM1166 Design Engineering Test DET 2						■ HEAB DET 2																							
40mm Soldier Touch Point 2 (STP2)						■ STP2																							
40mm HEAB XM1166 Design Engineering Test DET 3									■ HEAB DET 3																				
40mm HEAB XM1166 Critical Design Review									▲ 2 HEAB CDR																				
40mm HEAB XM1166 DT&E										■ HEAB DT&E																			
40mm Soldier Touch Point 3 (STP3)											■ STP3																		
40mm HEAB XM1166 Milestone C												▲ 3 HEAB MS-C																	
40mm HEAB XM1166 Low Rate Initial Production													■ HEAB LRIP																

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EW1 / <i>40mm Low Velocity Ammunition</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
40mm HEAB XM1166 Cooperative Research & Development Agreement (CRADA) Testing	3	2017	1	2018
40mm HEAB XM1166 Milestone B	4	2018	4	2018
40mm HEAB XM1166 Engineering Manufacturing Development	4	2018	4	2022
40mm HEAB XM1166 Preliminary Design Review	2	2019	2	2019
40mm HEAB XM1166 Design Engineering Test DET 1	1	2020	2	2020
40mm Soldier Touch Point 1 (STP1)	1	2020	2	2020
40mm HEAB XM1166 Design Engineering Test DET 2	2	2020	3	2020
40mm Soldier Touch Point 2 (STP2)	3	2020	3	2020
40mm HEAB XM1166 Design Engineering Test DET 3	1	2021	2	2021
40mm HEAB XM1166 Critical Design Review	2	2021	2	2021
40mm HEAB XM1166 DT&E	4	2021	1	2022
40mm Soldier Touch Point 3 (STP3)	2	2022	2	2022
40mm HEAB XM1166 Milestone C	3	2022	3	2022
40mm HEAB XM1166 Low Rate Initial Production	3	2022	4	2023

Note

millimeter (mm)
 Low Velocity (LV)
 High Explosive Air Burst (HEAB)

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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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
FA6: 30mm Lethality	-	19.128	22.897	20.091	-	20.091	9.788	5.995	2.997	0.000	0.000	80.896
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The 30 millimeter (mm) Lethality project funds the development of a suite of 30x173mm caliber cartridges, which includes a High Explosive Airburst with Trace (HEAB-T) cartridge, XM1182, for increased anti-personnel effects, an Armor Piercing Fin Stabilized Discarding Sabot with Trace (APFSDS-T) cartridge XM1170 for anti-material, and ballistically matched training cartridges; Target Practice with Trace (TP-T) and Target Practice Discarding Sabot with Trace (TPDS-T). A non-developmental airburst munition will be Urgent Materiel Released (UMR) as an interim solution prior to HEAB-T cartridge. The objective is to enhance the operational effectiveness and lethality of the Stryker Infantry Carrier Vehicle (ICV), Next Generation Combat Vehicle (NGCV), and any Army Fighting Vehicles that are equipped with a 30x173mm weapon system. The tactical APFSDS-T cartridge will provide an organic direct fire capability to support infantry at a greater range and will improve lethality when engaging light-to-medium armored vehicles. The HEAB-T cartridge will provide the Warfighter with increased lethality against troops in the open, counter defilade, Anti-Tank Guided Missile (ATGM) teams, and troops behind urban structures. The training cartridges will be ballistically matched to the tactical cartridges, allowing the Warfighter to train in a cost effective manner. This project will leverage earlier efforts in support of the United States Army Europe (USAREUR) Operational Needs Statement (ONS) #15-20590 Stryker Increased Lethality for the 2nd Cavalry Regiment (2CR). Fiscal Year (FY) 2021 funding will support the continuation of Engineering, Manufacturing and Development (EMD) for all cartridges.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: 30X173mm Armor-Piercing Fin-Stabilized Discarding Sabot Trace (APFSDS-T) and Target Practice Discarding Sabot with Trace (TPDS-T)</p> <p>Description: Qualify 30x173mm armor piercing tactical and training cartridges for use on Stryker ICV, NGCV or other Army Future Fighting Vehicles.</p> <p>FY 2020 Plans: FY 2020 primary activities included three Design Engineering Tests (DET) and a Design Verification Test (DVT) for the non-airburst 30x173mm suite of ammunition. FY 2020 also supported the hardware build required for the remaining three DVTs scheduled for FY 2021.</p> <p>FY 2021 Base Plans: FY 2021 primary activities will include the continuation of the Design Engineering Tests and hardware build for the Developmental Test & Evaluation (DT&E) events.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	9.180	16.840	11.621	-	11.621

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Decreased due to hardware development initiated in FY 2020 thus reducing the effort in FY 2021.					
Title: 30x173mm HEAB-T and TP-T Description: Develop and qualify a 30x173mm airburst cartridge and trainer for use on Stryker Infantry Combat Vehicles (ICV), Next Generation Combat Vehicles (NGCV), or other Army Future Fighting Vehicles. FY 2020 Plans: FY 2020 primary activities included a Milestone B decision and awarded up to two contractors to support Engineering, Manufacturing, and Development (EMD). FY 2021 Base Plans: FY 2021 primary activities include DET & DT&E testing. FY 2020 to FY 2021 Increase/Decrease Statement: Funding request increased due to test costs and large quantity of hardware build in support of DT&E.	9.830	5.017	8.470	-	8.470
Title: 30x173mm Programmable Airburst Munitions (PABM) Urgent Materiel Release (UMR) Description: Qualify the 30x173mm MK310 Programmable Airburst Munition with Trace (PABM-T) ammunition to support the increased lethality for the 2nd Cavalry Stryker Regiment Directed Requirement.	0.118	-	-	-	-
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC 638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638	-	1.040	-	-	-
Accomplishments/Planned Programs Subtotals	19.128	22.897	20.091	-	20.091

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>
• E07610: CTG, 30MM, Progrmabl Air Burst Mun, Mk310, Linked	1.765	13.412	14.550	-	14.550	30.478	53.444	154.048	154.347	0.000	422.044

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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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
• E07306: CTG, 30mm TP-T, MK239, Single	8.686	8.528	2.997	3.000	5.997	6.996	6.996	7.026	7.026	0.000	51.255
• E07406: CTG, 30mm Hi Expl Incendry-T(HEI-T), Mk238 Series	10.017	10.976	2.405	6.000	8.405	6.404	6.404	6.445	6.445	0.000	55.096
• E09191: CTG, 30mm TPDS-T, MK317 (SABOT Trng), Single	15.123	4.000	6.992	4.000	10.992	8.991	11.780	9.999	10.847	0.000	71.732
• E09292: CTG, 30mm APFSDS-T, MK258, Single	8.788	25.232	2.564	11.900	14.464	20.463	20.463	20.643	20.643	0.000	130.696

Remarks

D. Acquisition Strategy

30X173mm APFSDS-T and TPDS-T: Proposals were requested from Industry to develop a 30x173mm APFSDS-T anti-materiel tactical cartridge (XM1170) and a 30x173mm TPDS-T anti-materiel training cartridge (XM1172) that will meet Army Performance Specifications and Stryker Lethality Annex Requirements. Other Transaction Agreement (OTA) through two DOTC contracts were awarded to contractors to support development, DET and DT&E in support of Milestone C. The Government will award Federal Acquisition Regulation (FAR)- based contracts for production of each cartridge.

30x173mm HEAB-T and TP-T: In support of the 30mm Multi-Function Munition Capability Development Document (CDD), the 30x173mm HEAB-T cartridge (XM1182) and the ballistically matched TP-T cartridge (XM1173) will be developed to meet the requirements. The Government anticipates awarding two contracts utilizing an Other Transaction Agreement (OTA) through DOTC to support development, DET and DT&E in support of Milestone C. The Government will down-select and award a single FAR-based contract for production.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.040		-		-		-	0.000	1.040	-
Subtotal			-	-		1.040		-		-		-	0.000	1.040	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
High Explosive Airburst with Trace (HEAB-T) TMRR Contract 1	C/CPFF	General Dynamics - Ordnance and Tactical Systems (GD-OTS) : Marion, IL	2.201	3.449	Jan 2019	-		-		-		-	0.000	5.650	-
High Explosive Airburst with Trace (HEAB-T) TMRR Contract 2	C/CPFF	Northrop Grumman Information Systems (NGIS) : Plymouth, MN	2.201	3.449	Jan 2019	-		-		-		-	0.000	5.650	-
High Explosive Airburst with Trace (HEAB-T) EMD Contract 1	C/CPFF	General Dynamics - Ordnance and Tactical Systems (GD-OTS) : Marion, IL	-	-		2.600	May 2020	3.516	Jan 2021	-		3.516	Continuing	Continuing	Continuing
High Explosive Airburst with Trace (HEAB-T) EMD Contract 2	C/CPFF	Northrop Grumman Information Systems (NGIS) : Plymouth, MN	-	-		2.602	May 2020	3.516	Jan 2021	-		3.516	Continuing	Continuing	Continuing
Armor Piercing Fin Stabilized Discarding Sabot with Trace (APFSDS-T) EMD Contract 1	C/CPFF	General Dynamics - Ordnance and Tactical Systems (GD-OTS) : Marion, IL	2.060	1.215	Jun 2019	7.027	Jan 2020	4.924	Jan 2021	-		4.924	0.000	15.226	-
Armor Piercing Fin Stabilized Discarding Sabot with Trace	C/CPFF	Northrop Grumman Information Systems	2.060	1.215	Jun 2019	7.027	Jan 2020	4.924	Jan 2021	-		4.924	0.000	15.226	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
(APFSDS-T) EMD Contract 2		(NGIS) : Plymouth, MN													
Steel Cartridge Case Development Contract	C/CPFF	General Dynamics - Ordnance and Tactical Systems : Marion, IL	-	5.793	Mar 2019	-		-		-		-	0.000	5.793	-
Subtotal			8.522	15.121		19.256		16.880		-		16.880	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering Support	MIPR	Combat Capabilities Development Command - Armaments Center (CCDC-AC) : Picatinny Arsenal, NJ	2.509	2.557	Jan 2019	2.427	Oct 2019	2.161	Nov 2020	-		2.161	Continuing	Continuing	Continuing
Subtotal			2.509	2.557		2.427		2.161		-		2.161	Continuing	Continuing	N/A

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			
MK310 Programmable Airburst Munition with Trace (PABM-T) Urgent Material Release (UMR) Qual	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	0.511	-		-		-		-		-	0.000	0.511	-
APFSDS-T Design Engineering Tests (DET)	MIPR	Aberdeen Test Center (ATC) : Aberdeen Proving Ground, MD	-	-		-		1.050	Oct 2020	-		1.050	0.000	1.050	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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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			
APFSDS-T Developmental Test & Evaluation (DT&E)	MIPR	Aberdeen Test Center (ATC) : Aberdeen Proving Ground, MD	-	-		0.174	Jul 2020	-		-		-	Continuing	Continuing	Continuing
High Explosive Airburst with Trace (HEAB-T) TMRR Testing	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	1.450	Jan 2019	-		-		-		-	0.000	1.450	-
Subtotal			0.511	1.450		0.174		1.050		-		1.050	Continuing	Continuing	N/A
Project Cost Totals			11.542	19.128		22.897		20.091		-		20.091	Continuing	Continuing	N/A

Remarks
 Design Engineering Tests (DET)
 Engineering and Manufacturing Development (EMD)
 Technology Maturation & Risk Reduction (TMRR)

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) FA6 / <i>30mm Lethality</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
Matériel Development Decision (MDD)			3 MDD																									
30mm APFSDS-T / TPDS-T EMD Contract Award			4 APFSDS-T / TPDS-T Contract Award																									
30mm APFSDS-T / TPDS-T EMD																												
30mm APFSDS-T DET Build																												
30mm APFSDS-T Design Engineer Test (DET)																												
30mm APFSDS-T Critical Design Review (CDR)																												
30mm APFSDS-T DT&E Hardware Build																												
30mm APFSDS-T Developmental Test & Evaluation (DT&E)																												
30mm APFSDS-T Milestone C																												
30mm APFSDS-T Low Rate Initial Production (LRIP)																												
30mm APFSDS-T Live Fire Test and Evaluation (LFT&E)																												
30mm TPDS-T DET Build																												
30mm TPDS-T Design Engineering Test (DET)																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality

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
30mm TPDS-T Critical Design Review (CDR)											10																	
30mm TPDS-T DT&E Hardware Build																												
30mm TPDS-T Developmental Test & Evaluation (DT&E)																												
30mm TPDS-T Milestone C																												
30mm TPDS-T Low Rate Initial Production (LRIP)																												
30mm HEAB-T TMRR Contract Awards																												
30mm HEAB-T Technology Maturation and Risk Reduction (TMRR)																												
30mm HEAB-T TMRR Engineering Test 1																												
30mm HEAB-T TMRR Engineering Test 2																												
30mm HEAB-T and TP-T EMD																												
30mm HEAB-T and TP-T Milestone B																												
30mm HEAB-T and TP-T EMD Contract Award																												
30mm HEAB-T / TP-T DET Build																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality

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
30mm HEAB-T and TP-T EMD Design Engineering Test (DET)																												
30mm HEAB-T / TP-T Critical Design Review (CDR)																												
30mm HEAB-T / TP-T DT&E Build																												
30mm HEAB-T and TP-T Developmental Test & Evaluation (DT&E)																												
30mm HEAB-T and TP-T Milestone C																												
30mm HEAB-T / TP-T Low Rate Initial Production (LRIP)																												
30mm HEAB-T Live Fire Test and Evaluation (LFT&E)																												
30mm HEAB-T Initial Operational Test and Evaluation (IOT&E)																												
30mm MK310 Mod 0 PABM-T UMR Safety Qualification Test																												
30mm MK310 Mod 0 PABM-T Urgent Materiel Release (UMR)																												
30mm MK310 Mod 0 PABM-T UMR Production Contract Award																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) FA6 / <i>30mm Lethality</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Material Development Decision (MDD)	3	2019	3	2019
30mm APFSDS-T / TPDS-T EMD Contract Award	4	2019	4	2019
30mm APFSDS-T / TPDS-T EMD	4	2019	1	2023
30mm APFSDS-T DET Build	2	2020	4	2020
30mm APFSDS-T Design Engineer Test (DET)	1	2021	1	2021
30mm APFSDS-T Critical Design Review (CDR)	3	2021	3	2021
30mm APFSDS-T DT&E Hardware Build	3	2021	1	2022
30mm APFSDS-T Developmental Test & Evaluation (DT&E)	2	2022	2	2022
30mm APFSDS-T Milestone C	1	2023	1	2023
30mm APFSDS-T Low Rate Initial Production (LRIP)	1	2023	3	2024
30mm APFSDS-T Live Fire Test and Evaluation (LFT&E)	2	2024	3	2024
30mm TPDS-T DET Build	3	2020	1	2021
30mm TPDS-T Design Engineering Test (DET)	2	2021	2	2021
30mm TPDS-T Critical Design Review (CDR)	3	2021	3	2021
30mm TPDS-T DT&E Hardware Build	4	2021	2	2022
30mm TPDS-T Developmental Test & Evaluation (DT&E)	3	2022	3	2022
30mm TPDS-T Milestone C	1	2023	1	2023
30mm TPDS-T Low Rate Initial Production (LRIP)	1	2023	3	2024
30mm HEAB-T TMRR Contract Awards	1	2019	1	2019
30mm HEAB-T Technology Maturation and Risk Reduction (TMRR)	1	2019	1	2020
30mm HEAB-T TMRR Engineering Test 1	3	2019	4	2019
30mm HEAB-T TMRR Engineering Test 2	4	2019	1	2020

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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Events	Start		End	
	Quarter	Year	Quarter	Year
30mm HEAB-T and TP-T EMD	2	2020	1	2023
30mm HEAB-T and TP-T Milestone B	2	2020	2	2020
30mm HEAB-T and TP-T EMD Contract Award	2	2020	2	2020
30mm HEAB-T / TP-T DET Build	2	2020	4	2020
30mm HEAB-T and TP-T EMD Design Engineering Test (DET)	1	2021	2	2021
30mm HEAB-T / TP-T Critical Design Review (CDR)	3	2021	3	2021
30mm HEAB-T / TP-T DT&E Build	3	2021	4	2021
30mm HEAB-T and TP-T Developmental Test & Evaluation (DT&E)	1	2022	3	2022
30mm HEAB-T and TP-T Milestone C	1	2023	1	2023
30mm HEAB-T / TP-T Low Rate Initial Production (LRIP)	2	2023	3	2024
30mm HEAB-T Live Fire Test and Evaluation (LFT&E)	2	2024	3	2024
30mm HEAB-T Initial Operational Test and Evaluation (IOT&E)	2	2024	3	2024
30mm MK310 Mod 0 PABM-T UMR Safety Qualification Build	2	2018	4	2018
30mm MK310 Mod 0 PABM-T UMR Safety Qualification Test	3	2018	1	2019
30mm MK310 Mod 0 PABM-T Urgent Materiel Release (UMR)	2	2019	2	2019
30mm MK310 Mod 0 PABM-T UMR Production Contract Award	4	2019	4	2019

Note

- Engineering Manufacturing Development (EMD)
- Armor Piercing Fin Stabilized Discarding Sabot with Trace (APFSDS-T)
- Target Practice Discarding Sabot with Trace (TPDS-T)
- High Explosive Airburst with Trace (HEAB-T)
- Target-Practice with Trace (TP-T)
- Technology Maturation and Risk Reduction (TMRR)
- Urgent Materiel Release (UMR)
- Programmable Airburst Munition with Trace (PABM-T)

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) FJ4 / Cannon-Delivered Area Effects Munitions (C-DAEM)			
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
FJ4: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	0.000	0.000	27.600	-	27.600	82.685	72.655	64.440	54.453	0.000	301.833
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project FJ4 Cannon-Delivered Area Effects Munitions (C-DAEM) transitions from Budget Activity (BA) 4 Program Element (PE) 0603639A Tank and Medium Caliber Ammunition Project FG1 C-DAEM.

A. Mission Description and Budget Item Justification

The C-DAEM Project will provide United States (U.S.) ground forces with the capability to engage area personnel through armored targets, while denying threat forces full operational freedom within the targeted area. An Analysis of Alternatives (AoA) was completed in January 2018 to inform Army acquisition and investment decisions regarding replacement of the current stockpile of 155 millimeter (mm) Dual Purpose Improved Conventional Munitions (DPICM) with Department of Defense (DoD) policy compliant munitions and address anti-armor and extended range capability requirements. The Army validated two materiel solutions for C-DAEM to be pursued in parallel. C-DAEM Armor (Increment 1) will destroy moved and moving infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM DPICM Replacement (Increment 2) will destroy personnel to light-skinned vehicles. Fiscal Year (FY) 2021 funding will support qualification of C-DAEM DPICM Replacement solution(s) for safety, performance, and DoD policy compliance verification testing to support the Army's modernization priorities in support of the National Defense Strategy.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: C-DAEM DPICM Replacement	-	-	27.600	-	27.600
Description: C-DAEM DPICM Replacement will destroy personnel to light-skinned vehicles.					
FY 2021 Base Plans: FY 2021 funding will support qualification of DPICM Replacement hardware to support the Army's modernization priorities in support of the National Defense Strategy.					
FY 2020 to FY 2021 Increase/Decrease Statement: Increase in funding from FY 2020 to FY 2021 due to technology maturation resulting in the transition of C-DAEM DPICM Replacement into the Engineering Manufacturing & Development (EMD) phase. Project FJ4 Cannon-Delivered Area Effects Munitions (C-DAEM) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project FG1 C-DAEM.					
Accomplishments/Planned Programs Subtotals	-	-	27.600	-	27.600

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FJ4 / Cannon-Delivered Area Effects Munitions (C-DAEM)
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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>
• FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	5.713	21.447	40.961	-	40.961	-	-	-	-	Continuing	Continuing

Remarks

Project FJ4 Cannon-Delivered Area Effects Munitions (C-DAEM) transitions from BA 4 PE 0603639A Tank and Medium Caliber Ammunition Project FG1 C-DAEM.

A Procurement of Ammunition, Army (PAA) funding line for C-DAEM DPICM Replacement, Standard Serial Number (SSN) E68604, PROJ, ARTY, 155MM C-DAEM INCREMENT 2, will be established in FY 2024 for this effort.

D. Acquisition Strategy

C-DAEM will employ an evolutionary acquisition approach to efficiently transition the unique ammunition products as they become available. The AoA completed on 31 January 2018 qualified a dramatic enhancement of operational Fires effectiveness, efficiency, and maneuver support when cannon artillery was equipped with a dedicated extended range, anti-armor projectile. In FY 2021, C-DAEM will utilize Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiatives for DPICM Replacement in support of hardware qualification testing. The U.S. Government will lead EMD efforts to complete qualification and meet Milestone C requirements by 4th Quarter (Q) FY 2024. C-DAEM DPICM Replacement will transition to a Federal Acquisition Regulation (FAR) based production contract after Milestone C for Low Rate Initial Production (LRIP) and Full Rate Production (FRP).

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FJ4 / Cannon-Delivered Area Effects Munitions (C-DAEM)
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management	Various	Office of the Project Manager Combat Ammunition Systems (PM CAS) : Picatinny Arsenal, NJ	-	-		-		1.000	Oct 2020	-		1.000	0.000	1.000	-
Subtotal			-	-		-		1.000		-		1.000	0.000	1.000	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DPICM Replacement Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : Picatinny Arsenal, NJ	-	-		-		19.700	Dec 2020	-		19.700	0.000	19.700	-
Subtotal			-	-		-		19.700		-		19.700	0.000	19.700	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	-	-		-		4.400	Oct 2020	-		4.400	0.000	4.400	-
Subtotal			-	-		-		4.400		-		4.400	0.000	4.400	N/A

Remarks
Engineering support includes fire control software and firing table development required for qualification testing.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FJ4 / Cannon-Delivered Area Effects Munitions (C-DAEM)
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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			
DPICM Replacement Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	-		-		2.500	Mar 2021	-		2.500	0.000	2.500	-
Subtotal			-	-		-		2.500		-		2.500	0.000	2.500	N/A
Project Cost Totals			-	-		0.000		27.600		-		27.600	0.000	27.600	N/A

Remarks
C-DAEM DPICM Replacement will destroy personnel to light-skinned vehicles.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FJ4 / Cannon-Delivered Area Effects Munitions (C-DAEM)

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																
Armor Engineering Manufacturing & Development (EMD)																																												
Armor Critical Design Review													EMD																1 CDR								2 MS-C							
Armor Milestone C																																												
DPICM Replacement Qualification and Testing																																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) FJ4 / <i>Cannon-Delivered Area Effects Munitions (C-DAEM)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Armor Engineering Manufacturing & Development (EMD)	1	2022	4	2024
Armor Critical Design Review	2	2022	2	2022
Armor Milestone C	4	2024	4	2024
DPICM Replacement Qualification and Testing	1	2021	4	2023

Note

C-DAEM Armor will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM Dual Purpose Improved Conventional Munition (DPICM) Replacement will destroy personnel to light-skinned vehicles. C-DAEM Armor and DPICM Replacement are being developed simultaneously.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons			
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
FL4: Small Caliber Ammo for Next Gen Squad Weapons	-	0.000	18.180	30.600	-	30.600	28.723	24.976	11.739	11.858	0.000	126.076
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Small Caliber Ammo for Next Gen Squad Weapons project is a critical technology development in response to the Soldier Lethality Cross Functional Team (SL CFT) Initial Capability Document (ICD) for the ammunition required to support the rapid prototyping, development, and fielding of the Next Generation Squad Weapons (NGSW) under the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding. The objective is to develop and Full Materiel Release (FMR) the new ammunition in parallel with the NGSW rifle and automatic rifle. The NGSW ammunition is split into two initial projectile variants, the General Purpose (GP) and the Special Purpose (SP). Fiscal Year (FY) 2021 funding supports continuing rapid prototyping/development of the GP projectile, building prototypes and delivering prototypes to the weapon system contractors for integration into the weapon system development, conducting prototype testing and engineering testing. FY 2021 also supports continuing rapid prototyping for the SP projectile, conducting a Critical Design Review (CDR), conducting prototype testing and engineering testing. FY 2021 supports development of prototype solutions for the Reduced Range Ammunition (RRA) variant; to include building and evaluating RRA concepts/designs, and conducting a Preliminary Design Review (PDR). FY 2021 also includes development efforts to evaluate competing concepts/solutions for the tracer ammunition variant required for the NGSW; including maturing/refining tracer ammunition designs and performing engineering tests. FY 2021 supports initial activities to evaluate potential solutions/prototypes and concepts to satisfy follow-on NGSW ammunition requirements. Follow-on NGSW ammunition types includes: Blank and Close Combat Mission Capability Kit (CCMCK) training ammunition. Development efforts on the follow-on NGSW ammunition variants will continue into FY 2022. This is a priority of the Secretary's Close Combat Lethality Task Force. Funding for this project aligns with the Army's priorities in support of the National Defense Strategy.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Rapid Prototyping GP	-	12.449	10.500	-	10.500
Description: Develop, demonstrate, and qualify new ammunition for the NGSW systems.					
FY 2020 Plans: FY 2020 efforts were focused on continuing rapid prototyping/development of the GP projectile, building prototypes and maturing prototypes to provide to the weapon system contractors for performance evaluation, conducting a CDR, and conducting prototype testing.					
FY 2021 Base Plans: Continuing rapid prototyping/development of the GP projectile, build prototypes and deliver prototypes to the weapon system contractors for integration into the weapon system development and conduct prototype testing					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
and engineering testing. Evaluate prototype weapon systems from three contractors, conduct system level CDR, and down-select to one weapon system. FY 2020 to FY 2021 Increase/Decrease Statement: Based on planned activities.					
Title: Rapid Prototyping SP Description: Develop, demonstrate, and qualify new ammunition to defeat hard targets for the NGSW systems. FY 2020 Plans: FY 2020 efforts focused on continuing Rapid Prototyping for the Special Purpose projectile, conducting a Preliminary Design Review (PDR), conducting an Initial Product Review, and performing activities to increase prototype capacity to support planned weapon system. FY 2021 Base Plans: Continuing rapid prototyping for the Special Purpose (SP) projectile, conduct a Critical Design Review (CDR), and conduct prototype testing and engineering testing in preparation for cartridge system integration with weapons systems from three contractors. FY 2020 to FY 2021 Increase/Decrease Statement: Based on planned activities.	-	3.810	14.100	-	14.100
Title: Rapid Prototyping Reduced Range Ammunition (RRA) for NGSW Description: Develop and qualify RRA for the NGSW that will satisfy the requirement to provide training ammunition suitable for use on military installations with Surface Danger Zone (SDZ) restrictions. FY 2020 Plans: Conducted an Initial Product Review (IPR), assessed initial prototypes, and performed preparation activities to begin the rapid prototyping RRA effort. FY 2021 Base Plans: Begin rapid prototyping effort to develop RRA for the NGSW. Develop and mature RRA projectile concepts, award prototype development contract, investigate manufacturing processes, build and evaluate concept/ prototype RRA ammunition. And, conduct a PDR in preparation for cartridge integration. FY 2020 to FY 2021 Increase/Decrease Statement:	-	0.095	3.500	-	3.500

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Planned activities to satisfy the RRA ammunition requirement.					
Title: Rapid Prototyping Tracer Ammunition for NGSW Description: Rapid prototyping effort to develop and field tracer ammunition for the NGSW systems by building and evaluating competing tracer ammunition designs/concepts then down-selecting to a final tracer design. FY 2021 Base Plans: Will begin rapid prototyping effort to develop tracer ammunition for the NGSW. Build and evaluate competing tracer ammunition designs/concepts, down-select to a tracer ammunition design, begin the process of maturing/refining selected design by performing engineering tests and implementing improvements based upon test results. FY 2020 to FY 2021 Increase/Decrease Statement: Start of effort to satisfy the tracer requirement.	-	-	1.500	-	1.500
Title: Concept Evaluation of other NGSW Ammunition Variants Description: Concept development/evaluation of follow-on variants / ammunition for the NGSW. FY 2020 Plans: Explored/evaluated ammunition prototypes and concepts of follow-on ammunition for the NGSW. Follow-on NGSW ammunition types included: tracer ammunition, blank ammunition, reduced range ammunition, and Close Combat Mission Capability Kit (CCMCK) ammunition. FY 2021 Base Plans: The follow-on variations of the ammunition for the various concepts will be developed and fabricated in support of engineering development, safety, prototype system testing. A system Design Review anticipated in 1QFY21 and a user assessment scheduled for 3QFY21. Follow-on NGSW ammunition types included: tracer ammunition, blank ammunition, reduced range ammunition, and Close Combat Mission Capability Kit (CCMCK) ammunition.	-	1.000	1.000	-	1.000
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC 638 FY 2020 Plans:	-	0.826	-	-	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding transferred in accordance with Title 15 USC 638					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC 638					
Accomplishments/Planned Programs Subtotals	-	18.180	30.600	-	30.600

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>
• EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	5.334	6.821	0.000	-	0.000	-	-	-	-	0.000	12.155
• EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	20.247	-	0.000	-	0.000	-	-	-	-	0.000	20.247
• E06002: NEXT GENERATION COMBAT ROUND	-	-	11.988	-	11.988	20.519	60.880	187.813	189.692	0.000	470.892

Remarks

Budget Activity (BA) 4 (Program Element (PE) 0603639A Tank and Medium Caliber Ammunition Project EC2 RDTE/Adv Armor-Piercing (ADVAP) for Small Cal Ammo: This funding line starts the rapid development/rapid prototyping work on the SP ammunition for the NGSW systems.

BA 5 PE 0604802A Weapons and Munitions - Eng Dev Project EP5 RDTE/Adv Armor-Piercing (ADVAP) for Small Caliber Ammo: This funding line starts the rapid prototyping/development work on the GP ammunition for the NGSW systems.

Procurement of Ammunition, Army E06001 / Next Generation Combat Round: This funding line supports the procurement of ammunition for the NGSW.

D. Acquisition Strategy

The NGSW ammunition program will utilize the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding to develop ammunition concepts/designs for the GP variant and the SP variant. The project will utilize Government developed projectile designs that will be delivered to development contractors as Government Furnished Material (GFM). The Government will select up to three contractors for the weapon system development and down-select to a single contractor in FY 2021, prior to production contract award; with a planned Urgent Materiel Release (UMR) in FY 2022 and FMR in FY 2024. Development effort for the Reduced Range and Tracer ammunition will follow a similar strategy beginning in FY 2021. Follow-on development efforts for additional NGSW ammunition variants including blank and CCMCK ammunition will start in FY 2022.

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				FL4 / Small Caliber Ammo for Next Gen Squad Weapons							
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	-	-		0.826		-		-		-	0.000	0.826	-
Subtotal			-	-		0.826		-		-		-	0.000	0.826	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
Follow-on Ammo Prototypes/Concepts	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		0.125	Oct 2019	0.200	Oct 2020	-		0.200	Continuing	Continuing	Continuing
Projectile and Ammo Development Contract General Purpose	Option/CPFF	OLIN Winchester Corporation (LCAAP) : Lake City, Missouri	-	-		6.924	Jan 2020	5.000	Nov 2020	-		5.000	Continuing	Continuing	Continuing
Projectile and Ammo Development Contract Special Purpose	Option/CPFF	OLIN Winchester Corporation (LCAAP) : Lake City, Missouri	-	-		1.925	Jan 2020	7.000	Nov 2020	-		7.000	Continuing	Continuing	Continuing
Tracer Ammunition Prototype Contract	TBD	To Be Determined : To Be Determined	-	-		-		0.750	Jan 2021	-		0.750	Continuing	Continuing	Continuing
Reduced Range Ammunition Prototype Contract 1	TBD	To Be Determined : To Be Determined	-	-		-		1.000	Jan 2021	-		1.000	Continuing	Continuing	Continuing
Reduced Range Ammunition Prototype Contract 2	TBD	To Be Determined : To Be Determined	-	-		-		1.000	Jan 2021	-		1.000	Continuing	Continuing	Continuing
Subtotal			-	-		8.974		14.950		-		14.950	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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				FL4 / Small Caliber Ammo for Next Gen Squad Weapons							
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Development and Prototyping Special Purpose	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		1.425	Oct 2019	-		-		-	Continuing	Continuing	Continuing
Projectile Development and Support General Purpose	MIPR	Army Research Lab : Aberdeen, Maryland	-	-		0.675	Oct 2019	-		-		-	Continuing	Continuing	Continuing
Tracer Ammunition Development and Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		-		0.350	Oct 2020	-		0.350	Continuing	Continuing	Continuing
Reduced Range Ammunition Prototype and Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		0.025	Jul 2020	1.000	Oct 2020	-		1.000	Continuing	Continuing	Continuing
Projectile Development and Support General Purpose	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		3.655	Oct 2019	2.000	Oct 2020	-		2.000	Continuing	Continuing	Continuing
Projectile Development and Support Special Purpose	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		-		5.150	Oct 2020	-		5.150	Continuing	Continuing	Continuing
Subtotal			-	-		5.780		8.500		-		8.500	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
Prototype Testing CCDC Armaments Center General Purpose	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		0.825	Oct 2019	-		-		-	Continuing	Continuing	Continuing
U.S. Army Aberdeen Test Center (ATC) General Purpose	MIPR	Aberdeen Proving Ground : Aberdeen, Maryland	-	-		0.425	Oct 2019	0.900	Oct 2020	-		0.900	Continuing	Continuing	Continuing
U.S. Army Aberdeen Test Center (ATC) Special Purpose	MIPR	Aberdeen Proving Ground : Aberdeen, Maryland	-	-		0.425	Oct 2019	0.500	Oct 2020	-		0.500	Continuing	Continuing	Continuing

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons
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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			
Army Research Lab (ARL) Testing General Purpose	MIPR	Aberdeen Proving Ground : Aberdeen, Maryland	-	-		0.925	Oct 2019	1.300	Oct 2020	-		1.300	Continuing	Continuing	Continuing
Army Research Lab (ARL) Testing Special Purpose	MIPR	Aberdeen Proving Ground : Aberdeen, Maryland	-	-		-		1.250	Oct 2020	-		1.250	Continuing	Continuing	Continuing
Tracer Ammunition Engineering Tests	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		-		0.400	Oct 2020	-		0.400	Continuing	Continuing	Continuing
Reduced Range Ammunition Prototype Testing	MIPR	U.S. Army Aberdeen Test Center (ATC) : Aberdeen, Maryland	-	-		-		0.500	Oct 2020	-		0.500	Continuing	Continuing	Continuing
Engineering Tests General Purpose	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		-		1.300	Oct 2020	-		1.300	Continuing	Continuing	Continuing
Engineering Tests Special Purpose	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	-	-		-		1.000	Oct 2020	-		1.000	Continuing	Continuing	Continuing
Subtotal			-	-		2.600		7.150		-		7.150	Continuing	Continuing	N/A
Project Cost Totals			-	-		18.180		30.600		-		30.600	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons

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			
Rapid Prototyping Effort	Rapid Prototyping																														
Initial Product Review 1 (IPR 1) Special Purpose	1 IPR 1 SP																														
Preliminary Design Review General Purpose (PDR-GP)		2 PDR-GP																													
Initial Product Review 2 (IPR 2) Special Purpose			3 IPR 2 SP																												
Preliminary Design Review General Purpose (PDR-SP)				4 PDR-SP																											
Critical Design Review General Purpose (CDR-GP)					5 CDR-GP																										
Prototype Test 1								PT1																							
Initial Product Review 3 (IPR 3) Special Purpose								6 IPR 3 SP																							
Full Materiel Release (FMR) Transitions from BA04 EC2 to BA05 FL4									8 FMR BA04 to BA05 Transition																						
Critical Design Review Special Purpose (CDR-SP)									9 CDR-SP																						
Prototype Test 2										PT2																					
Engineering Tests											Engineering Tests																				
Live Fire Test and Evaluation (LFT&E)											LFT&E																				

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons

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
Prototype & Manufacturing Integration (GP & SP)													Mfg Integration GP & SP															
Urgent Materiel Release Special Purpose (UMR SP)													▲ 13 UMR SP															
Urgent Materiel Release General Purpose (UMR GP)													▲ 14 UMR GP															
Rapid Fielding																												
Production Qualification Test Special Purpose (PQT SP)													PQT SP															
Full Materiel Release (FMR)													▲ 18 FMR															
Initial Product Review (IPR) Reduced Range Ammo (RRA)									▲ 7 IPR RRA																			
Prototype Manufacturing Reduced Range Ammo (RRA)																									Prototype Manufacturing RRA			
Preliminary Design Review (PDR) Reduced Range Ammo (RRA)													▲ 11 PDR-RRA															
Developmental Testing (DT) Reduced Range Ammo (RRA)													DT-RRA															
Critical Design Review Reduced Range Ammo (CDR-RRA)													▲ 15 CDR-RRA															
Product Qualification Testing Reduced Range Ammo (PQT-RRA)													PQT-RRA															
Urgent Materiel Release Reduced Range Ammo (UMR RRA)													▲ 17 UMR-RRA															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons

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
Initial Product Review (IPR) Tracer Ammo									10																			
Preliminary Design Review (PDR) Tracer Ammo									12																			
Safety Testing Tracer Ammo																												
Critical Design Review (CDR) Tracer Ammo									16																			
Prototype Testing Tracer Ammo																												
Rapid Fielding Tracer Ammo																												
Materiel Release (MR) Tracer Ammo									19																			
Rapid Prototyping Blank and CCMCK Ammo (Follow-On Developmental Efforts)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Rapid Prototyping Effort	1	2019	4	2026
Initial Product Review 1 (IPR 1) Special Purpose	2	2019	2	2019
Preliminary Design Review General Purpose (PDR-GP)	3	2019	3	2019
Initial Product Review 2 (IPR 2) Special Purpose	4	2019	4	2019
Preliminary Design Review General Purpose (PDR-SP)	2	2020	2	2020
Critical Design Review General Purpose (CDR-GP)	3	2020	3	2020
Prototype Test 1	3	2020	4	2020
Initial Product Review 3 (IPR 3) Special Purpose	4	2020	4	2020
Full Materiel Release (FMR) Transitions from BA04 EC2 to BA05 FL4	2	2021	2	2021
Critical Design Review Special Purpose (CDR-SP)	2	2021	2	2021
Prototype Test 2	2	2021	3	2021
Engineering Tests	2	2021	3	2021
Live Fire Test and Evaluation (LFT&E)	2	2021	3	2021
Prototype & Manufacturing Integration (GP & SP)	4	2021	3	2022
Urgent Materiel Release Special Purpose (UMR SP)	4	2022	4	2022
Urgent Materiel Release General Purpose (UMR GP)	4	2022	4	2022
Rapid Fielding	4	2022	4	2027
Production Qualification Test Special Purpose (PQT SP)	1	2023	2	2023
Full Materiel Release (FMR)	2	2024	2	2024
Initial Product Review (IPR) Reduced Range Ammo (RRA)	4	2020	4	2020
Prototype Manufacturing Reduced Range Ammo (RRA)	1	2021	3	2022
Preliminary Design Review (PDR) Reduced Range Ammo (RRA)	4	2021	4	2021

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons
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Events	Start		End	
	Quarter	Year	Quarter	Year
Developmental Testing (DT) Reduced Range Ammo (RRA)	4	2022	1	2023
Critical Design Review Reduced Range Ammo (CDR-RRA)	2	2023	2	2023
Product Qualification Testing Reduced Range Ammo (PQT-RRA)	2	2023	3	2023
Urgent Materiel Release Reduced Range Ammo (UMR RRA)	4	2023	4	2023
Initial Product Review (IPR) Tracer Ammo	4	2021	4	2021
Preliminary Design Review (PDR) Tracer Ammo	2	2022	2	2022
Safety Testing Tracer Ammo	1	2023	2	2023
Critical Design Review (CDR) Tracer Ammo	2	2023	2	2023
Protoypete Testing Tracer Ammo	3	2023	1	2024
Rapid Fielding Tracer Ammo	1	2024	4	2026
Materiel Release (MR) Tracer Ammo	4	2024	4	2024
Rapid Prototyping Blank and CCMCK Ammo (Follow-On Developmental Efforts)	4	2021	4	2026

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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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
S36: Precision Guidance Kit	-	27.155	30.500	33.365	-	33.365	22.396	12.960	4.995	3.326	0.000	134.697
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Precision Guidance Kit (PGK) M1156 is a course correcting fuze that provides precision accuracy and efficiency for current and future 155 millimeter (mm) High Explosive (HE) projectiles by eliminating a portion of the inherent errors associated with ballistic firing solutions, which effectively reduces the number of projectiles required to execute fire missions. PGK utilizes a Global Positioning System (GPS) receiver and internal Guidance and Navigation Computer to accomplish its mission with point detonating and height of burst fuzing functions. The PGK M1156E1 development effort, Long Range-PGK (LR-PGK), will qualify state of the art technologies for operation in GPS degraded environments and compatibility with Army Modernization objectives under the Long Range Precision Fires Cross Functional Team's (LRPF CFT) new long range cannon, Extended Range Cannon Artillery (ERCA). The ERCA and its new long range projectiles require the LR-PGK to meet lethality requirements, and will be fielded during the PGK Life Cycle. LR-PGK supports the Army's modernization priorities in support of the National Defense Strategy and future 155mm projectiles and M777 Long Range Cannon (LRC) initiatives. Fiscal Year (FY) 2021 funding supports the award of a follow-on Engineering and Manufacturing Development (EMD) contract for system design and prototype development for LR-PGK.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: Contractor - EMD</p> <p>Description: Work performed by contractor(s) in support of PGK development.</p> <p>FY 2020 Plans: Supported EMD activities including prototype development, build and test activities as well as tactical guided flight testing in the threat environment.</p> <p>FY 2021 Base Plans: EMD activities including prototype development, build and test activities as well as tactical guided flight testing in the threat environment.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 increase to support Army modernization requirements to achieve lethality at 70 kilometers (km) with precision accuracy by FY 2023.</p>	23.585	26.224	29.333	-	29.333
<p>Title: Government and Engineering Support</p> <p>Description: Work performed by the United States Government (USG) to support PGK development.</p>	2.413	2.353	2.557	-	2.557

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 Plans: Provided engineering support of development, build and test activities which included prototype and tactical guided flight testing.</p> <p>FY 2021 Base Plans: Engineering support of development, build and test activities which will include prototype and tactical guided flight testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 Government and Engineering Support decrease due to additional Development/Operational Testing costs.</p>					
<p>Title: Development/Operational Testing</p> <p>Description: Specific development and operational testing activities to validate technology maturation.</p> <p>FY 2020 Plans: Provided engineering support of development, build and test activities which included prototype and tactical guided flight testing.</p> <p>FY 2021 Base Plans: Engineering support of system development test activities which will include prototype and tactical guided flight testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 increase due to additional test activities to support Army modernization requirements to achieve lethality at 70km with precision accuracy by FY 2023.</p>	1.157	0.538	1.475	-	1.475
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638</p>	-	1.385	-	-	-
Accomplishments/Planned Programs Subtotals	27.155	30.500	33.365	-	33.365

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit

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>
• E99250: <i>FUZE, 155mm ARTY Precision Guidance Kit (PGK)</i>	217.933	160.596	139.036	21.675	160.711	79.034	72.523	76.029	85.629	Continuing	Continuing

Remarks

Procurement of Ammunition, Army (PAA) funding for M1156 (NA36) through FY 2023 with transition to LR-PGK M1156E1 (NZ04) in FY 2024.

D. Acquisition Strategy

The PGK is a GPS guidance kit with fuzing functions for 155mm HE artillery projectiles. PGK provides precision accuracy and effectiveness for 155mm HE projectiles. The PGK corrects the inherent errors associated with ballistic firing solutions and reduces the number of artillery projectiles required to execute the mission. The current PGK Increment has been qualified for the M795 and M549A1 HE projectiles. This increment of PGK entered Low Rate Initial Production (LRIP) at Milestone C in March 2013. Initial Operational Test and Evaluation (IOT&E) was completed in FY 2015, Full Material Release (FMR) was approved in FY 2016, Full Rate Production (FRP) decision and Initial Operational Capability (IOC) occurred FY 2016. Follow-on LR-PGK development efforts are focused on addressing performance in GPS degraded environments as well as ensuring compatibility with the Army's new long range 155mm cannon and projectiles, which are scheduled to be fielded in the same timeframe as the new increment of PGK. The contracting strategy includes competitive DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) concept development efforts with multiple contractors in FY 2017, followed by a DOTC Risk Reduction concept maturation phase in FY 2018 through FY 2019. Down-select to one system contractor and EMD DOTC contract award will occur in FY 2020. Demonstration efforts to support Milestone C will continue through 2023. The Program will transition to a Federal Acquisition Regulation (FAR) based production contract after Milestone C for LRIP in FY 2024 and FRP in FY 2025.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Office	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	13.947	0.048	Oct 2018	0.060	Dec 2019	0.100	Oct 2020	-		0.100	0.000	14.155	14.067
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.385		-		-		-	0.000	1.385	-
Subtotal			13.947	0.048		1.445		0.100		-		0.100	0.000	15.540	N/A

Remarks
Program Management support includes LR-PGK travel and documentation support. Fiscal Year (FY) 2021 increase to support additional testing activities.

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DOTC - LR-PGK Engineering and Manufacturing Development (EMD) - TBD	C/CPAF	TBD : TBD	-	-		25.646	Mar 2020	29.333	Mar 2021	-		29.333	0.000	54.979	33.046
DOTC - PGK GPS Anti-Jam Development - GD-OTS	MIPR	DoD Ordnance Technology (DOTC) - General Dynamics Ordnance & Tactical Systems : Bothell, WA	7.416	6.072	Feb 2019	-		-		-		-	0.000	13.488	7.167
DOTC - PGK GPS Anti-Jam Development - BAE	MIPR	DoD Ordnance Technology (DOTC) - BAE Systems / Rokar : Minneapolis, MN	7.274	7.187	May 2019	-		-		-		-	0.000	14.461	7.167
DOTC - PGK GPS Anti-Jam Development - L3 IEC	MIPR	DOD Ordnance Consortium (DOTC) - L3 - IEC : Various	3.341	10.326	Jan 2019	-		-		-		-	0.000	13.667	10.551

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			18.031	23.585		25.646		29.333		-		29.333	0.000	96.595	N/A

Remarks
FY 2021 increase to support Army modernization requirements to achieve lethality at 70km with precision by FY 2023.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	36.183	2.365	Oct 2018	2.409	Dec 2019	2.457	Oct 2020	-		2.457	0.000	43.414	41.412
Subtotal			36.183	2.365		2.409		2.457		-		2.457	0.000	43.414	N/A

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			
Development Testing for GPS Anti-Jam	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	1.146	1.032	Jan 2019	1.000	Aug 2020	-		-		-	0.000	3.178	2.896
System Development Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	10.442	-		-		1.475	Aug 2021	-		1.475	0.000	11.917	10.442

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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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	Cost To Complete			
Other Development Testing	MIPR	Various : Various	1.769	0.125	May 2019	-		-		-		-	0.000	1.894	1.769	
Subtotal			13.357	1.157		1.000		1.475		-		1.475	0.000	16.989	N/A	

Remarks
FY 2021 increase due to additional test activities to support Army modernization requirements to achieve lethality at 70km with precision by FY 2023.

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
	81.518	27.155	30.500	33.365	-	33.365	0.000	172.538	N/A

Remarks
Defense Ordnance Technology Consortium (DOTC)
Long Range-Precision Guidance Kit (LR-PGK)
Engineering and Manufacturing Development (EMD)
Army Test and Evaluation Command (ATEC)

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) S36 / <i>Precision Guidance Kit</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 Maturation and Risk Reduction (TMRR) and EMD	[Redacted]																																			
	TMRR/ EMD																																			
XM1113 / XM1128 / ERCA Requirements & Design Updates	[Redacted]																																			
	New Requirements & Design Updates																																			
Source Selection					[Redacted]																															
					Source Selection																															
Contract Award					▲ 1 Award																															
Prototype Development & Testing					[Redacted]																															
					Prototyping & Testing																															
System Requirements / System Functional Reviews					▲ 2 SRR / SFR																															
Preliminary Design Review (PDR)									▲ 3 PDR																											
Milestone B													▲ 4 MS-B																							
Critical Design Review (CDR)													▲ 5 CDR																							
Qualification Testing													[Redacted]																							
													Qualification Testing																							
ERCA Increment 1C First Unit Issues (FUI)																					▲ 6 ERCA Inc 1C FUI															
Milestone C																					▲ 7 MS-C															
Initial Operation Test and Evaluation (IOT&E)																					[Redacted]															
																					IOT&E															

Note
Several knowledge points pushed out to extend Engineering and Manufacturing Development (EMD) Prototype Development and Testing phase due to additional Army modernization requirements to achieve lethality at 70 kilometer (km) with precision accuracy by Fiscal Year (FY) 2023.

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Technology Maturation and Risk Reduction (TMRR) and EMD	1	2019	1	2024
XM1113 / XM1128 / ERCA Requirements & Design Updates	1	2019	4	2020
Source Selection	4	2019	1	2020
Contract Award	2	2020	2	2020
Prototype Development & Testing	2	2020	2	2022
System Requirements / System Functional Reviews	3	2020	3	2020
Preliminary Design Review (PDR)	2	2021	2	2021
Milestone B	2	2022	2	2022
Critical Design Review (CDR)	2	2022	2	2022
Qualification Testing	2	2022	1	2024
ERCA Increment 1C First Unit Issues (FUI)	4	2023	4	2023
Milestone C	1	2024	1	2024
Initial Operation Test and Evaluation (IOT&E)	1	2024	2	2025

Note

Engineering and Manufacturing Development (EMD)

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) XT2 / 40mm Door Breach
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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
XT2: 40mm Door Breach	-	0.000	0.000	3.023	-	3.023	0.000	0.000	0.000	0.000	0.000	3.023
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY2021.

Project XT2 40 millimeter (mm) Door Breach (DB) is a new start in Fiscal Year (FY) 2021.

A. Mission Description and Budget Item Justification

The 40mm Low Velocity (LV) Door Breach (DB), XM1167, cartridge allows the grenadier to conduct a ballistic breach of an existing door to create an entry point into a building or other structure. This capability is critical during Urban Operations, while having stand-off ability to conduct ballistic breach at ranges up to 50 meters away, with a single-shot, and without pause between actual breach and entry of initial force. The 40mm DB cartridge will provide the small unit with the capability to conduct efficient breaching operations; allowing the Warfighter to create an entry point into a structure for an assault element to enter and begin clearing operations, one of the most difficult types of operations that Soldiers may face in an urban environment. The 40mm DB cartridge will reduce collateral damage and friendly casualties associated with breaching operations. The deployment of 40mm DB cartridges will enable the small unit to gain and maintain a tactical advantage through efficiency of combat power and momentum. FY 2021 will consist of Developmental Testing and Evaluation (DT&E) efforts for the purpose of qualifying the Door Breach cartridge design.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: 40mm LV DB, XM1167	-	-	3.023	-	3.023
Description: Engineering and Manufacturing Development (EMD) Activities.					
FY 2021 Base Plans: FY 2021 activities include DT&E efforts.					
FY 2020 to FY 2021 Increase/Decrease Statement: Project XT2 40mm Door Breach is a new start in FY 2021.					
Accomplishments/Planned Programs Subtotals	-	-	3.023	-	3.023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) XT2 / 40mm Door Breach

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

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	Total Cost
			Base	OCO	Total					Complete	
• E71505: CTG, 40mm LV, Door Breach (DB)	-	-	0.000	-	0.000	2.997	2.997	-	-	0.000	5.994

Remarks

D. Acquisition Strategy

The DB cartridge development consists of characterization testing of multiple designs provided by industry which will be used to further inform a future down-select to a single design that will be taken through DT&E. Following DT&E, the program will proceed to Milestone C. After Milestone C, the program will enter into Low Rate Initial Production (LRIP) and conduct Final Hazard Classification (FHC) testing. The program will use the results of DT&E, LRIP and FHC testing to achieve Type Classification and Full Materiel Release in FY 2023.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) XT2 / 40mm Door Breach
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Low Velocity (LV) Door Breach XM1167 Test Materials	C/CPFF	TBS : TBS	-	-		-		0.830	Jan 2021	-		0.830	0.000	0.830	-
Subtotal			-	-		-		0.830		-		0.830	0.000	0.830	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LV Door Breach XM1167 - Combat Capabilities Development Command - Armaments Center (CCDC-AC)	MIPR	Picatinny Arsenal : NJ	-	-		-		0.497	Dec 2020	-		0.497	0.000	0.497	-
Subtotal			-	-		-		0.497		-		0.497	0.000	0.497	N/A

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			
LV Door Breach XM1167 Developmental Test & Evaluation	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		-		1.696	Mar 2021	-		1.696	0.000	1.696	-
Subtotal			-	-		-		1.696		-		1.696	0.000	1.696	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
Project Cost Totals			-	-	0.000	3.023	-	3.023	0.000	3.023	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) XT2 / 40mm Door Breach

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				
Low Velocity Door Breach XM1167 Test Hardware Builds									■				■																			
Low Velocity Door Breach XM1167 Developmental Test and Evaluation (DT&E)													■				■															
Low Velocity Door Breach XM1167 Milestone C																	▲ 1															
Low Velocity Door Breach XM1167 Final Hazard Classification Testing (FHC)																					■											
Low Velocity Door Breach XM1167 Low Rate Initial Production Award (LRIP)																					▲ 2											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) XT2 / 40mm Door Breach

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Low Velocity Door Breach XM1167 Test Hardware Builds	1	2021	2	2021
Low Velocity Door Breach XM1167 Developmental Test and Evaluation (DT&E)	3	2021	4	2021
Low Velocity Door Breach XM1167 Milestone C	1	2022	1	2022
Low Velocity Door Breach XM1167 Final Hazard Classification Testing (FHC)	1	2022	2	2022
Low Velocity Door Breach XM1167 Low Rate Initial Production Award (LRIP)	2	2022	2	2022

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

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng 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	-	70.096	107.826	49.694	-	49.694	52.808	34.690	16.285	15.607	0.000	347.006
194: Engine Driven Gen Ed	-	1.743	8.395	10.655	-	10.655	12.852	13.150	6.804	7.115	0.000	60.714
EC9: Contingency Basing Infrastructure	-	1.509	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.509
EJ9: Maneuver Support Vessel (MSV)	-	32.950	27.046	11.484	-	11.484	2.728	2.416	0.000	0.000	0.000	76.624
FG4: Ultra-Lightweight Camouflage Net System (ULCANS)	-	3.729	11.400	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.129
H01: Combat Engineer Eq Ed	-	3.270	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.270
H02: Tactical Bridging - Engineering Development	-	7.050	44.452	12.398	-	12.398	24.154	8.333	0.000	0.000	0.000	96.387
L39: Field Sustainment Support Ed	-	2.674	1.675	1.718	-	1.718	1.771	1.805	1.798	1.798	0.000	13.239
L41: Water And Petroleum Distribution - Ed	-	8.366	7.540	10.988	-	10.988	8.492	7.492	6.494	5.495	0.000	54.867
L43: ENGINEER SUPPORT EQUIPMENT - ED	-	0.341	1.242	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.583
L46: Maintenance Support Equipment	-	1.365	5.000	1.349	-	1.349	0.839	0.000	0.000	0.000	0.000	8.553
L47: Improved Environmental Control Units Ed	-	2.262	1.076	1.102	-	1.102	1.972	1.494	1.189	1.199	0.000	10.294
VR7: Combat Service Support Systems	-	4.837	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.837

A. Mission Description and Budget Item Justification
 This Program Element (PE) provides system development and demonstration for various projects. This PE includes the development of water craft, military tactical bridging, material handling equipment, construction equipment, engineer support equipment, soldier support equipment (to include shelter systems, environmental

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>
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control, field service equipment, camouflage systems and aerial delivery equipment), water purification equipment, petroleum distribution equipment, and mobile electric power.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	76.388	103.226	51.605	-	51.605
Current President's Budget	70.096	107.826	49.694	-	49.694
Total Adjustments	-6.292	4.600	-1.911	-	-1.911
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-7.400			
• Congressional Rescissions	-	-			
• Congressional Adds	-	12.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-6.292	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-1.911	-	-1.911

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

Project: FG4: *Ultra-Lightweight Camouflage Net System (ULCANS)*

Congressional Add: *Mobile Camouflage System (MCS)*

Congressional Add Subtotals for Project: FG4

Project: L46: *Maintenance Support Equipment*

Congressional Add: *Next Generation High Mobility Multipurpose Wheeled Vehicle (HMMWV) Shop Equipment Contact Maintenance (SECM)*

Congressional Add Subtotals for Project: L46

Congressional Add Totals for all Projects

	FY 2019	FY 2020
	-	6.901
Congressional Add Subtotals for Project: FG4	-	6.901
	0.195	5.000
Congressional Add Subtotals for Project: L46	0.195	5.000
Congressional Add Totals for all Projects	0.195	11.901

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) 194 / <i>Engine Driven Gen Ed</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
194: <i>Engine Driven Gen Ed</i>	-	1.743	8.395	10.655	-	10.655	12.852	13.150	6.804	7.115	0.000	60.714
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This line supports the Army Network Modernization Strategy Line of Effort #4, Command Post. This line develops the capabilities to improve power generation and distribution within the Army Command Posts which in turn reduces Command Post sustainment requirements.

This project supports the Tactical Electric Power (TEP) programs (2kW-800kW Generators and Associated Equip) which is established to develop a modernized, standard family of Mobile Electric Power (MEP) systems to include MEP Generating Sources (MEPGS), and MEP Distribution Systems (MEPDS), MEP Storage Systems (MEPSS) and MEP Management Systems (MEPMS) for all Services throughout the Department of Defense IAW DoDI 4120.11. Building on the device/component evaluations conducted in PE 0603804A project G11, this project supports the system development and demonstration of a series of innovative mobile electric power systems that are essential to the development and eventual fielding of modernized MEPGS, MEPMS, MEPSS and MEPDS. This project also supports Army modernization priorities, specifically Combat Support/Combat Service Support (CS/CSS) demands in Network / Command, Control, Communications & Intelligence (C3I), Soldier Lethality, Air/ Missile Defense and Precision Fires and reduces sustainment requirements.

PDISE provides reliable, modular design power distribution equipment that is critical to deploying power networks. PDISE will add power distribution > 60kW. The equipment developed will provide an interface for future Onboard Vehicle Power system and Hybrid power systems.

FY 2021 funds will support the Prime Power Distribution System (PPDS) testing and development and STEP Engineering, Manufacturing and Development (EMD).

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Power Distribution Illumination Systems Electrical (PDISE) expansion	1.743	3.754	1.866	-	1.866
Description: Prepare PDISE - Prime effort by awarding the Prime Power Distribution System (PPDS) contract, developing Prime Power Connection Kit first article units and start developmental testing.					
Provides safe power distribution from the point of generation to the point of need - Network/C3I, Air & Missile Defense, Long Range Precision Fires, Command Post and Combat Support/Combat Service Support systems.					
PDISE components are man-portable, safe for all weather operation and allows the warfighter to get electricity where its needed, when its needed. It provides flexibility to field operations and can be quickly assembled/dissembled for rapid relocation.					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) 194 / <i>Engine Driven Gen Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 Plans: Continue PDISE expansion EMD Phase.</p> <p>FY 2021 Base Plans: Development of Prime Power Distribution System (PPDS) and Large Power Distribution Systems (LPDS) to continue and begin testing FY 2022.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: 194 RDT&E line will be shared across the Tactical Electric Power portfolio.</p>					
<p>Title: STEP</p> <p>Description: The Small Tactical Electrical Power (STEP) program will provide the Warfighter with expeditionary power solutions designed for combat operations in the most austere environments. STEP will replace existing legacy 2kW (MTG) sets and 3kW (TQG) sets. STEP models will be more mobile, lightweight, reliable, and logistically supportable than their predecessors.</p> <p>FY 2021 Base Plans: Small Tactical Electric Power (STEP) enters into MS B in 3Q FY 2021. STEP Contract expected to be awarded 3Q FY 2021. The development contract for lightweight TPS and Hybrid Augmentation System (HAS) LOEs will be awarded in 4Q FY 2021.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase is due to the initiation of EMD for STEP program.</p>	-	-	8.789	-	8.789
<p>Title: Small Power Sources</p> <p>Description: Supports Tactical Electric Power in the 2kW-3kW range. Focuses on modernizing small power with hybrid and battery storage capabilities.</p> <p>FY 2020 Plans: Testing will occur on the lightweight TPS systems received under FY 2020 industry incentivizing effort to determine the entry point into the acquisition lifecycle for this line of effort (LOE). Development of 3kW auto start kit and testing of 3kW hybrid system.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	-	4.259	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) 194 / <i>Engine Driven Gen Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
No funds requested for FY 2021.					
Title: FY 2020 SBIR/STTR Transfer	-	0.382	-	-	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
Accomplishments/Planned Programs Subtotals	1.743	8.395	10.655	-	10.655

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>
• G11: <i>Adv Elec Energy Con Ad</i>	6.224	3.338	0.000	-	0.000	-	-	-	-	0.000	9.562
• MA9800: <i>Generators And Associated Equip</i>	136.906	115.912	53.433	0.106	53.539	61.474	61.630	65.220	54.980	Continuing	Continuing

Remarks

D. Acquisition Strategy
 The Small Tactical Electric Power (STEP) program is a modernization program that will provide a family of systems of improved mobile Tactical Electric Power (TEP) sources and will replace the legacy 2 kilowatt (kW) Military Tactical Generator (MTG) and the 3kW Tactical Quiet Generator (TQG). STEP models will be lightweight, modular, reliable, and more logistically supportable power sources than their predecessors for the Department of Defense's (DoD) 21st Century digitized forces. The acquisition for STEP will incorporate Joint service requirements to reduce cost, maximize interoperability and increase performance over existing generator systems. STEP will implement 3 separate lines of effort. Lightweight Tactical Power Source (TPS) will conduct an effort to incentivize the industry and foster competition for small power generator. The intent is to streamline the development phase and to determine the entry point into the acquisition lifecycle. Pending the result of the effort, two of the three systems (Lightweight Tactical Power Source (TPS) and Hybrid Augmentation System (HAS)) will start the development phase in FY 2021. This will include systems integration, prototyping, Soldier evaluations, limited testing and systems demonstration to deliver a design to meet all performance requirements and to provide the technical, logistics documentation to support STEP under the Army's two level maintenance concept. As these two Lines of Effort (LOE) end development phase in FY23, the 3kW hardened TPS effort will start development following a similar acquisition approach to the first two LOEs.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) 194 / <i>Engine Driven Gen Ed</i>

The Power Distribution Illumination Systems Electrical (PDISE) program will use a multi-phase acquisition strategy, continue to consolidate requirements and provide solutions to known power distribution capability gaps. The effort will include PDISE Medium, the current Army power distribution equipment (PDISE) and the microgrid feeder box; PDISE - Large, the multi-input Power Distribution Unit (PDU) being developed for use with large tactical electric power generators and PDISE Prime, the Prime Power Connection Kit (PPCK) and other products to provide the full range of power distribution equipment to support present and future power system requirements.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) 194 / <i>Engine Driven Gen Ed</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PDISE Prime	Various	PM E2S2 : Ft. Belvoir	1.275	-		0.702		-		-		-	Continuing	Continuing	Continuing
Small Power Sources	Various	PM E2S2 Ft. Belvior : Ft. Belvior	1.132	-		0.452		1.250		-		1.250	0.000	2.834	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.382		-		-		-	0.000	0.382	-
Subtotal			2.407	-		1.536		1.250		-		1.250	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PDISE Prime	C/CPFF	TBD : TBD	2.506	-		1.698		-		-		-	Continuing	Continuing	Continuing
AMMPS HYBRID	TBD	AMMPS HYBRID : FT. BELVOIR	-	1.743	May 2019	-		-		-		-	0.000	1.743	-
Small Power Sources	TBD	STEP : TBD	-	-		2.753		4.739		-		4.739	0.000	7.492	-
Subtotal			2.506	1.743		4.451		4.739		-		4.739	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PDISE	Various	Various : Various	-	-		0.452		-		-		-	0.000	0.452	-
Small Power Sources	TBD	STEP : TBD	-	-		0.452		1.100		-		1.100	0.000	1.552	-
Subtotal			-	-		0.904		1.100		-		1.100	0.000	2.004	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) 194 / <i>Engine Driven Gen Ed</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
Prime Power Distribution System (FPDS)																												
FPDS award					▲ 1																							
PPCK Build																												
PPCK FAT																												
PPCK Production									▲ 4																			
MS B/C STEP Lightweight TPS									▲ 2																			
STEP Lightweight TPS EMD																												
STEP Lightweight TPS MS C													▲ 5															
MS B Hybrid Augmentation System (HAS)									▲ 3																			
STEP HAS EMD																												
MS C- STEP HAS													▲ 6															
MS B STEP hardened TPS																	▲ 7											
STEP 3kW hardened TPS EMD																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) 194 / <i>Engine Driven Gen Ed</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
STEP 3kW hardened TPS MS C																									8 ▲			

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) 194 / <i>Engine Driven Gen Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Prime Power Distribution System (PPDS)	2	2020	3	2021
PPDS award	3	2020	3	2020
PPCK Build	3	2020	1	2021
PPCK FAT	1	2021	2	2021
PPCK Production	3	2021	3	2021
MS B/C STEP Lightweight TPS	2	2021	2	2021
STEP Lightweight TPS EMD	3	2021	4	2022
STEP Lightweight TPS MS C	1	2023	1	2023
MS B Hybrid Augmentation System (HAS)	2	2021	2	2021
STEP HAS EMD	3	2021	4	2022
MS C- STEP HAS	1	2023	1	2023
MS B STEP hardened TPS	2	2023	2	2023
STEP 3kW hardened TPS EMD	3	2023	1	2025
STEP 3kW hardened TPS MS C	1	2025	1	2025

Note
Medium Power Distribution System (MPDS) is composed of the M200, M100, M40, M60 and M46.

Army Senior Leadership made the decision to no longer invest in Large Tactical Power rather prioritizing Small Tactical Power to support Soldier Lethality critical programs.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>			Project (Number/Name) EC9 / <i>Contingency Basing Infrastructure</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
EC9: <i>Contingency Basing Infrastructure</i>	-	1.509	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.509
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Note: Project EC9 efforts are scheduled to be completed in FY 2019.

This project develops the tools and processes that will optimize recommendations for the materiel used to establish, operate, and maintain contingency bases. The project will increase the available knowledge at the base level and provide an analytical foundation for sound investment decision making. The continuous improvement modeling and simulation analysis tools will match the evolution of threats and technologies. Using a system of systems engineering approach, the Contingency Base Infrastructure (CBI) Product Directorate's focus ensures optimum integration of materiel across the base camp to facilitate the maximizing of Warfighter effectiveness. CBI's analytical results will allow leadership to make data driven, informed decisions on the acquisition and employment/deployment of equipment. This enables contingency bases to be established, operated and managed as a system (system of systems) and the equipment acquired for the base to be compatible and efficient while providing the maximum overall support to the Warfighter. This approach supports Program(s) of Record (PORs) to maximize improvements in Operational Energy and ensures efficiencies across all Areas of Responsibility (AOR).

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Toolset Development	1.059	-	-	-	-
Description: CBI employs Systems Engineers and System Architects to continue the maturation of tools by applying analytical rigor and a systems of systems methodology in toolset development. The toolset provides the backbone for the analysis support to the field allowing operational users to make informed decisions for the design of base camps. The Systems Database is a repository for Contingency Base (CB) information and is available as a single source of information to the CB community. Funding is provided for the following efforts in FY 2018 and FY 2019.					
Title: Integrated Analysis and Design	0.100	-	-	-	-
Description: CBI employs Systems Engineers, Operational Research System Analysts and collaborates with Sandia National Laboratories to provide the methodologies, modeling and analysis engines, and the analysis required to recommend and mature the optimized equipment sets that comprise a base camp. Optimized sets range from Platoon to Brigade sized camps in Armor, Infantry, Stryker, Medical, and Logistic camps that					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EC9 / <i>Contingency Basing Infrastructure</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
optimize the usage of fuel, water, waste and manpower. Funding is provided for the following efforts in FY 2018 and FY 2019.					
Title: Capabilities Implementation and Materiel Requirements Description: CBI employs System Integrators and Engineering Technicians to develop, update and refine system data set strategies of equipment using the developed optimized base camp designs. Funding is provided for the following efforts in FY 2018 and FY 2019.	0.300	-	-	-	-
Title: Program Management Description: Programmatic support and oversight of cost schedule, performance, risk and operational activities in managing the product office. Funding is provided for the following efforts in FY 2018 and FY 2019.	0.050	-	-	-	-
Accomplishments/Planned Programs Subtotals	1.509	-	-	-	-

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
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EC9 / <i>Contingency Basing Infrastructure</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
Toolset Development	[Redacted]				[Redacted]																							
	Toolset Development				[Redacted]																							
Integrated Analysis and Design	[Redacted]				[Redacted]																							
	Integrated Analysis and Design				[Redacted]																							
Armor Brigade Combat Team Core, Expansion/Enhancement S	[Redacted]				[Redacted]																							
	ABCT				[Redacted]																							
Striker Brigade Combat Team Core, Expansion/Enhancement Sets (SBC	[Redacted]				[Redacted]																							
	SBCT				[Redacted]																							
Capabilities Implementation and Materiel Requirements	[Redacted]				[Redacted]																							
	Capabilities Implementation and Materiel Requirements				[Redacted]																							
Program Management	[Redacted]				[Redacted]																							
	Program Management				[Redacted]																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EC9 / <i>Contingency Basing Infrastructure</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Toolset Development	1	2016	4	2019
Integrated Analysis and Design	1	2016	4	2019
Initial Data Transition to JCMS, Initial Operational Capability (IOC)	4	2018	4	2018
Armor Brigade Combat Team Core, Expansion/Enhancement Sets (ABCT)	2	2018	4	2019
Striker Brigade Combat Team Core, Expansion/Enhancement Sets (SBCT)	2	2019	4	2019
Capabilities Implementation and Materiel Requirements	1	2016	4	2019
Program Management	1	2016	4	2019
Infantry Brigade Combat Team, Core, Expansion/Enhancements Sets (IBCT)	2	2017	1	2018

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) EJ9 / <i>Maneuver Support Vessel (MSV)</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
EJ9: <i>Maneuver Support Vessel (MSV)</i>	-	32.950	27.046	11.484	-	11.484	2.728	2.416	0.000	0.000	0.000	76.624
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Army's new Maneuver Support Vessels (MSVs) support Dynamic Force Repositioning (DFR) and provides the Combatant and Multi-Domain Task Force Commander with organic waterborne lift capability that can deliver today's Army maneuver platforms and equipment, and supply bulk fuel and water across the full spectrum of operations with increased speed and lower draft; and mitigates anti-access/area denial (A2/AD) threat by providing access to shallow coastal waters, rivers, in narrow inland waterways in support of dispersed force elements in austere environments and where mature ports or road networks are unavailable. The MSVs are critical modernization efforts in support of the Army's Watercraft Transformation Strategy (AWTS) and Army Force Package 2.0.

The Maneuver Support Vessel (Light) - MSV(L) is the first modernization program which will displace the Army's aging Landing Craft Mechanized-8 (LCM-8) class of vessels. The LCM-8 does not have the speed, functional draft (shallow water capability), and maneuver capability to move today's Army Maneuver Platforms.

The MSV-L provides upgraded capabilities such as higher operational speed, reduced draft and increased payload to conduct maneuver support missions including delivery of the Army's maneuver platforms such as a combat configured Abrams, Stryker and Bradley Fighting Vehicles along with critical sustainment missions including delivery of food, water, fuel, and ammunition. The MSV(L) program is currently in the Engineering and Manufacturing Development (EMD). Specifically, FY 2021 funds the production of the single full scale MSV(L) prototype, contractor and government testing of the prototype and support for milestone documentation for Milestone C approval.

The Maneuver Support Vessel (Next) - MSV(N) is the second modernization program in the AWTS. In FY 2021, the Army is initiating feasibility studies to determine if the Army can replace both the aging Logistics Support Vessel (LSV) and the Landing Craft Utility (LCU) class of vessels with one common vessel class. Although the LSV and LCU vessels are the Army's Watercraft highest operational vessel classes, the Army must also evolve to meet the needs of the future Multi-Domain Task Force and Combatant Command missions. Specifically, FY 2021 funds the start of the MSV(N) market research, affordability and feasibility studies to inform future watercraft modernization requirements and an Analysis of Alternatives (AoA).

In general, all Army Watercraft funding supports initiatives to enhance the seaworthiness, safety, and survivability while increasing the lethality, tactical mobility, and operational capability of the Army Mariner to preserve the Combatant Commanders requirement of "freedom of seas" access in all areas of the world particularly the littorals, to support maneuver operations in all Areas of Responsibility.

In FY 2021, \$0.178 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
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel (MSV)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: Engineering and Manufacturing Development (EMD) Contract</p> <p>Description: The EMD phase of the contract includes system engineering and analysis to support execution of the Preliminary Design Review (PDR), Critical Design Review (CDR), Contract Systems Integration Laboratory (CSIL) fabrication, model basin testing, production of full-scale prototype vessel and required testing. In addition, deliverables include development of Integrated Product Support (IPS) analysis and products, as well as, development of Technical Data Package (TDP).</p> <p>FY 2020 Plans: Activities include completion of the full scale prototype vessel, testing and evaluation activities, and development of logistics products.</p> <p>FY 2021 Base Plans: Completion of the MSV(L) prototype vessel production and testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 finalizes the prototype costs for the EMD contract.</p>	28.149	23.896	3.040	-	3.040
<p>Title: Government Test and Evaluation Support</p> <p>Description: Government test support.</p> <p>FY 2020 Plans: Testing evaluation activities to include various subsystems and initial contractor prototype extended acceptance trials.</p> <p>FY 2021 Base Plans: Testing evaluation activities to include contractor prototype extended acceptance trials and follow on government testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Required testing activities for FY 2021 will be for various subsystems extended acceptance trials and follow on government testing.</p>	0.535	0.643	0.950	-	0.950
<p>Title: Government Furnished Equipment (GFE)</p>	0.002	0.125	0.125	-	0.125

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel (MSV)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Program Management Support to end the EMD phase of MSV(L) and start of concept design for MSV (Next) in Cyber Security, Contract Data Requirement List (CDRL) management, IMS support, C4ISR expertise, and Milestone C program documentation. FY 2020 to FY 2021 Increase/Decrease Statement: Increase is due to the start of the MSV (Next) program.					
Title: MSV(N) Affordability and Feasibility Studies Description: Conduct Affordability and Feasibility Studies for future watercraft modernization. FY 2021 Base Plans: Support initiation of Feasibility Study for future watercraft modernization. FY 2020 to FY 2021 Increase/Decrease Statement: Increase is due to future watercraft modernization in FY 2021.	-	-	3.548	-	3.548
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638	-	1.228	-	-	-
Accomplishments/Planned Programs Subtotals	32.950	27.046	11.484	-	11.484

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
• R03050: <i>Maneuver Support Vessel (Light) (MSV-L)</i>	-	14.185	76.576	-	76.576	72.938	102.524	148.006	128.106	0.000	542.335
Remarks	Significant Accomplishments: - Critical Design Review (CDR) 1, 25 Feb - 1 Mar 2019 for Structure, Propulsion, Auxiliary piping. - Critical Design Review (CDR) 2, 24 -26 April 2019 for Electrical C4ISR, outfitting.										

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel (MSV)</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>
- Knowledge Point 4 Scale Model Demo, 22 Jan 2019.											
- Knowledge Point 5 CDR, 10 Sept 2019											
- Virtual User Evaluation at FT. Eustis 11-14 Feb 2019.											
-User Evaluation of Contractor System Integration Laboratory (CSIL) and ESOH working group 5-6 Nov 2019.											

D. Acquisition Strategy

MSV(L): The program will achieve Milestone C in FY21, followed by Low Rate Initial Production (LRIP) and Full Rate Production (FRP). The single full scale prototype will undergo contractor and government testing, which will inform the updated Joint Capabilities Integration Development System (JCIDS) requirements documentation at MS C. Following successful prototype testing, JCIDS requirements documentation approval and MS C approval, the Milestone Decision Authority (MDA) will authorize the start of the Production and Deployment (P&D) phase.

MSV(N): The FY 2021 market research, affordability and feasibility studies will be utilized to inform future Analysis of Alternatives and Acquisition Strategy development.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) EJ9 / Maneuver Support Vessel (MSV)
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.228		-		-		-	0.000	1.228	-
Subtotal			-	-		1.228		-		-		-	0.000	1.228	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering and Manufacturing Development (EMD)	C/FFP	Vigor Works, LLC : Clackamas, OR	22.588	28.149	Nov 2018	23.896	Nov 2019	3.040	Nov 2020	-		3.040	0.000	77.673	78.000
Government Furnished Equipment (GFE)	Reqn	Various : Various	2.293	0.002	Jan 2019	0.125	Jan 2020	0.125	Jan 2021	-		0.125	0.000	2.545	-
Trade Studies and Business Analysis MSV(N)	TBD	Various : Various	-	-		-		2.960	Nov 2020	-		2.960	Continuing	Continuing	-
Subtotal			24.881	28.151		24.021		6.125		-		6.125	Continuing	Continuing	N/A

Remarks
MSV(L) Contract was awarded on 28 Sep 2017 to Vigor Works, LLC.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Salaries for Matrix Personnel Army Watercraft, TARDEC, ILSC PSID and ACC-Wrm.	MIPR	Detroit Arsenal : Warren, MI 48397-5000	12.995	3.100	Nov 2018	0.676	Nov 2019	3.373	Dec 2020	-		3.373	0.000	20.144	-
Salaries / Travel for Program Management Support Contracts	C/CPFF	Picatinny Arsenal, New Jersey 07806-5000 : Warren, MI 48397-5000	2.583	1.164	Apr 2019	0.478	Feb 2020	1.036	Dec 2020	-		1.036	0.000	5.261	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel (MSV)</i>
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			15.578	4.264		1.154		4.409		-		4.409	0.000	25.405	N/A

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			
Test and Evaluation - Government	MIPR	ATEC: APG : APG, MD	0.490	0.535	Nov 2018	0.643	Nov 2019	0.950	Nov 2020	-		0.950	0.000	2.618	-
Subtotal			0.490	0.535		0.643		0.950		-		0.950	0.000	2.618	N/A

Remarks
As the MSV(L) EMD phase progresses, increased testing activities will occur for subsystems and the contractor prototype extended acceptance trials.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	40.949	32.950	27.046	11.484	-	11.484	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel (MSV)</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		
Salaries for Matrix Support																														
Contractor System Integration Laboratory (CSIL)																														
Model Basin Testing																														
Knowledge Point 4 (KP4)	1																													
Critical Design Review (CDR)	2																													
Knowledge Point 5 (KP5)				3																										
Prototype Build																														
Prototype Test and Evaluation (includes Subsystem tests)																														
Knowledge Point 6 (KP6) - LRIP Authorized									4																					
Milestone C												5																		
Low Rate Initial Production (LRIP) Authorized												6																		
Future Watercraft Modernization																														

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel (MSV)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Salaries for Matrix Support	4	2016	4	2025
Analysis of Alternatives (AoA) Final Report Complete	2	2015	2	2015
Capabilities Development Document (CDD) Approved	4	2015	4	2015
Configuration Steering Board (CSB) Held and Approved	1	2016	1	2016
Industry Day Held	1	2016	1	2016
Army Requirements Oversight Board (AROC) / CDD Update	4	2016	4	2016
CDD Update / Army Requirements Oversight Council (AROC)	4	2016	4	2016
RFP Posting	4	2016	4	2016
RFP Released	1	2017	1	2017
Milestone B	4	2017	4	2017
Contract Award - Knowledge Point 2	4	2017	4	2017
Knowledge Point 2 (KP2)	2	2018	2	2018
Preliminary Design Review (PDR)	3	2018	3	2018
Knowledge Point 3 (KP3)	4	2018	4	2018
Modeling and Simulation	4	2018	4	2018
Contractor System Integration Laboratory (CSIL)	4	2018	4	2021
Model Basin Testing	4	2018	1	2019
Knowledge Point 4 (KP4)	2	2019	2	2019
Critical Design Review (CDR)	2	2019	2	2019
Knowledge Point 5 (KP5)	1	2020	1	2020
Prototype Build	4	2019	1	2021
Prototype Test and Evaluation (includes Subsystem tests)	4	2019	3	2021

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel (MSV)</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
Knowledge Point 6 (KP6) - LRIP Authorized	3	2021	3	2021
Milestone C	4	2021	4	2021
Low Rate Initial Production (LRIP) Authorized	4	2021	4	2021
Future Watercraft Modernization	1	2021	4	2023

Note
 After MS C approval in FY 2021, the MSV(L) program will transition into the P&D phase in FY 2022.
 MSV(N) program begins with market research, affordability and feasibility studies.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev				Project (Number/Name) FG4 / Ultra-Lightweight Camouflage Net System (ULCANS)			
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
FG4: Ultra-Lightweight Camouflage Net System (ULCANS)	-	3.729	11.400	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.129
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

ULCANS provides increased survivability against multi-spectral visual, infrared and radar threats, thermal signature suppression and significant thermal/solar reduction capability. ULCANS is capable of use in all types of weather and climatic conditions except in heavy snow and winds. ULCANS variants are integrated systems that are very lightweight, easily deployable, versatile, user friendly and tailored to the equipment meeting the requirements of operations for combat systems, command and control equipment, logistic support sites, tactical facilities, and fixed facilities. RDT&E funding for ULCANS Increment I program supports formal development for necessary technology/signature enhancements of three ULCANS Increment I variants (Woodland, Arctic, Desert/Urban) to replace current legacy ULCANS variants (Woodland and Desert).

Mobile Camouflage System (MCS) provides Full Spectrum Signature Management for Vehicles from ground, aerial, and satellite. MCS enables combat vehicle protection and survivability against current peer and near-peer threats; defeats enemy targeting and surveillance systems through multi-spectral concealment (UV, VIS, NIR, SWIR, Thermal, Radar); enables multi-domain operations in A2/AD environment and provides operational units layered protection and concealment against long-range precision fires, drones, ground, aerial, and satellite threats.

Funding supports modernization of current camouflage net systems by investigating technology insertions that decrease Soldier and platform detection from threat sensors. Funding also supports developing initial prototypes to enable refinement of operational requirements and early user feedback to maintain overmatch signature reduction against future threat sensors.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Ultra-lightweight Camouflage Net System (ULCANS)	3.729	4.300	-	-	-
Description: ULCANS is durable, robust, snag resistant state of the art camouflage system that provides increased survivability against multi-spectral visual, infrared and radar threats, thermal signature suppression and significant thermal/solar reduction capability. ULCANS utilizes a snag-free design and is capable of use in all types of weather and climatic conditions except in heavy snow and winds. ULCANS variants are integrated systems that are very lightweight, easily deployable, versatile, user friendly and tailored to the equipment meeting the requirements of operations for combat systems, command and control equipment, logistic support sites, tactical facilities, and fixed facilities. RDT&E funding for ULCANS Increment I program supports formal					

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) FG4 / <i>Ultra-Lightweight Camouflage Net System (ULCANS)</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
development for necessary technology/signature enhancements of three ULCANS Increment I variants (Woodland, Snow/Alpine, Desert/Urban) to replace current legacy ULCANS variants (Woodland and Desert). FY 2020 Plans: Complete logistics requirements for Snow/ Alpine ULCANS Increment I variants. Initiate development and DT/ OT, logistics requirements for Desert/Urban ULCANS Increment I variants. FY 2020 to FY 2021 Increase/Decrease Statement: Funding decremented to support Army modernization priorities					
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638	-	0.199	-	-	-
Accomplishments/Planned Programs Subtotals	3.729	4.499	-	-	-

	FY 2019	FY 2020
Congressional Add: Mobile Camouflage System (MCS) FY 2020 Plans: Mobile Camouflage System (MCS)	-	6.901
Congressional Adds Subtotals	-	6.901

C. Other Program Funding Summary (\$ in Millions)	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
• VR7: <i>Combat Service Support Systems</i>	4.837	-	0.000	-	0.000	-	-	-	-	0.000	4.837
• VR8: <i>Combat Service Support Systems - Ad</i>	3.115	-	0.000	-	0.000	-	-	-	-	0.000	3.115

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) FG4 / <i>Ultra-Lightweight Camouflage Net System (ULCANS)</i>

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

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

D. Acquisition Strategy

The acquisition strategy is to accelerate product development and testing to transition into production.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) FG4 / <i>Ultra-Lightweight Camouflage Net System (ULCANS)</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ULCANS	Various	PMFSS : Natick, MA	1.872	0.877		1.011		-		-		-	0.000	3.760	-
Mobile Camouflage System	TBD	PMFSS : Natick, MA	-	-		0.972		-		-		-	0.000	0.972	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.199		-		-		-	0.000	0.199	-
Subtotal			1.872	0.877		2.182		-		-		-	0.000	4.931	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ULCANS Increment I Woodland Variant	C/FFP	PMFSS : Natick, MA	5.750	0.857		-		-		-		-	0.000	6.607	-
ULCANS Increment I Snow/Alpine Variant	C/FFP	PMFSS : Natick, MA	5.632	1.307		0.872		-		-		-	0.000	7.811	-
ULCANS Increment I Desert/Urban Variant	C/FFP	PMFSS : Natick, MA	-	-		1.812		-		-		-	0.000	1.812	-
Mobile Camouflage System (MCS)	TBD	PM FSS : Natick, MA	-	-		3.972		-		-		-	0.000	3.972	-
Subtotal			11.382	2.164		6.656		-		-		-	0.000	20.202	N/A

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			
ULCANS Increment I Woodland Variant	Various	Various : Various	2.600	0.325		-		-		-		-	0.000	2.925	-
ULCANS Increment I Snow/Alpine Variant	Various	Various : Various	2.600	0.363		-		-		-		-	0.000	2.963	-
ULCANS Increment I Desert/Urban Variant	Various	Various : Various	-	-		0.591		-		-		-	0.000	0.591	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) FG4 / <i>Ultra-Lightweight Camouflage Net System (ULCANS)</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
EMD testing for Woodland Variant	██████████																											
Complete documentation to support MS C production decision for Woodland Variant	██████████																											
Obtain MS C production decision for Woodland Variant			▲ 1																									
EMD testing for Desert/Urban Variant				██████████																								
Complete documentation to support production decision for Desert/Urban Variant				██████████																								
Obtain production decision for Desert/Urban Variant							▲ 2																					
EMD testing for Snow/Alpine Variant					██████████																							
Complete documentation to support production decision for Snow/Alpine Variant						██████████																						
Obtain production decision for Snow/Alpine Variant											▲ 4																	
Award Development Contract for Mobile Camouflage System (MCS)											▲ 3																	
Developmental Testing for MCS								██████████																				
Obtain MS C for MCS											▲ 5																	

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) FG4 / <i>Ultra-Lightweight Camouflage Net System (ULCANS)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
EMD testing for Woodland Variant	1	2019	2	2019
Complete documentation to support MS C production decision for Woodland variant	1	2019	3	2019
Obtain MS C production decision for Woodland Variant	3	2019	3	2019
EMD testing for Desert/Urban Variant	4	2019	2	2020
Complete documentation to support production decision for Desert/Urban Variant	1	2020	3	2020
Obtain production decision for Desert/Urban Variant	3	2020	3	2020
EMD testing for Snow/Alpine Variant	2	2020	3	2020
Complete documentation to support production decision for Snow/Alpine Variant	3	2020	1	2021
Obtain production decision for Snow/Alpine Variant	1	2021	1	2021
Award Development Contract for Mobile Camouflage System (MCS)	4	2020	4	2020
Developmental Testing for MCS	4	2020	2	2021
Obtain MS C for MCS	2	2021	2	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev				Project (Number/Name) H01 / Combat Engineer Eq Ed			
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
H01: <i>Combat Engineer Eq Ed</i>	-	3.270	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.270
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports the engineering, manufacturing, and development of combat engineer equipment used in support of horizontal and vertical engineer construction missions, and to develop a variety of enabling systems that will support and improve mobility for Engineers in the Brigade Combat Teams (BCT), Combat Support Brigade (CSB), and Multi-Roll Bridge Company (MRBC) forces. This project also supports the development of enabling systems to meet critical capabilities of joint interdependence through Air and Ground Line of Communication and Rapid Tactical Earthmoving repair and construction which increase the operational reach of modular forces. Systems that support BCT and CSB forces include: High Mobility Engineer Excavators, Scrapers, Scoop Loaders, Skid Steer Loaders, Dozers, Cranes (ATEC and Family of All Terrain Cranes), Graders and Engineer Rapid Airfield Construction Capability (ERACC). Systems that support the MRBC included the Hydraulic Excavators (HYEX), Dozer, High Mobility Engineering Excavator (HMEE), and The All Terrain Crane.

This project also supports the effort for Construction Equipment Virtual Trainers (CEVTs) first article of each variant. The CEVTs are commercial off the shelf virtual training devices with software modifications for military unique tasks. These simulators enable the United States Army Engineer School with the capability to more effectively train Engineer Military Occupational Skill (MOS), while reducing maintenance of actual equipment and fuel costs during traditional training. These simulators provide the Engineer Warfighter with a multitude of training scenarios and continuous hands on training on a variety of construction equipment and in various simulated conditions. Use of CEVT increases skills and competency in the operation of equipment. The funding will be to perform integration, software development, contractor testing, contractor data gathering, and development of prototypes.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Construction Equipment Virtual Trainers (CEVT)	3.270	-	-	-	-
Description: These funds are for the development of Construction Equipment Virtual Trainers, which are Commercial-Off-the-Shelf virtual training simulators with software modifications for military unique tasks. CEVT will be used by the United States Army Engineer School (USAES) to train Engineer Military Occupational Skill (MOS). The funds will also be used to purchase NRE's for the following variants: Dozer, Grader, Scraper, Loader, and Hyex.					
Accomplishments/Planned Programs Subtotals	3.270	-	-	-	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H01 / <i>Combat Engineer Eq Ed</i>
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C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	Total Cost
			Base	OCO	Total					Complete	
• R05901: <i>High Mobility Engineer Excavator (HMEE)</i>	71.748	30.188	0.000	3.703	3.703	-	-	-	-	Continuing	Continuing
• R03801: <i>GRADER, MTZD, HVY</i>	-	-	5.406	-	5.406	-	-	-	-	0.000	5.406
• X01500: <i>Hydraulic Excavator</i>	5.226	0.500	5.186	7.600	12.786	-	-	-	-	Continuing	Continuing
• M06100: <i>TRACTOR FULL TRACKED, MED T-9</i>	-	13.060	4.715	7.450	12.165	-	-	-	-	0.000	25.225
• R06701: <i>All Terrain Cranes</i>	13.031	23.003	70.560	-	70.560	75.633	74.274	7.272	7.272	0.000	271.045
• R02800: <i>SCRAPER, EARTHMOVING, 14-18 CU YD</i>	8.061	3.910	4.188	-	4.188	-	-	-	-	0.000	16.159
• R07001: <i>Enhanced Rapid Airfield Construction Capap</i>	8.480	-	0.000	-	0.000	-	-	-	-	0.000	8.480
• R07003: <i>ERACC Type II, Enhanced Earthmoving</i>	8.480	-	0.000	-	0.000	-	-	-	-	0.000	8.480
• M05500: <i>Const Equip ESP</i>	33.289	38.660	8.925	0.657	9.582	9.469	8.926	8.926	8.926	Continuing	Continuing
• ML5350: <i>Items Less Than \$5.0M (Const Equip)</i>	6.103	4.731	0.000	-	0.000	-	-	-	-	0.000	10.834

Remarks

D. Acquisition Strategy

Conduct research, development, and investigations on future Construction Equipment (CE) 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 CE equipment.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H01 / <i>Combat Engineer Eq Ed</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
SBIR+STIR	TBD	TACOM : Warren, Michigan	0.167	-		-		-		-		-	0.000	0.167	-
Subtotal			0.167	-		-		-		-		-	0.000	0.167	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
System Pre-Award requirements, KPP, selection criteria development, Testing of systems	Various	TACOM & TARDEC : Warren, MI	1.675	-		-		-		-		-	0.000	1.675	-
Driver Assist	TBD	TBD : TBD	3.448	-		-		-		-		-	0.000	3.448	-
Design Armor Kits for Combat Engineer	Various	TARDEC : Warren, MI	5.995	-		-		-		-		-	0.000	5.995	-
CEVT	Various	PEO STRI : PEO, STRI, Orlando, FL	12.424	3.270	Jan 2020	-		-		-		-	0.000	15.694	-
Hazard Clearance at Speed	TBD	TARDEC : Warren, Michigan	0.001	-		-		-		-		-	0.000	0.001	-
Forced Entry: (Airborne/ Air Assault) Study/ Development	C/FFP	TBD : TBD	9.288	-		-		-		-		-	0.000	9.288	-
Market Research	TBD	TARDEC : Warren, Michigan	0.189	-		-		-		-		-	0.000	0.189	-
Machine Diagnostics	MIPR	Various : Various	0.600	-		-		-		-		-	0.000	0.600	-
Technology Insertion/ System Improvement	TBD	TBD : TBD	0.462	-		-		-		-		-	0.000	0.462	-
Weight Reduction in Transparent Armor (TA)	C/TBD	TBD : TBD	0.300	-		-		-		-		-	0.000	0.300	-
Telematics	MIPR	National Center for Manufacturing	0.310	-		-		-		-		-	0.000	0.310	-

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				H01 / Combat Engineer Eq Ed								
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	
		Science (NCMS) : CONUS														
Subtotal			34.692	3.270	-	-	-	-	-	-	-	0.000	37.962	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	
System Engineering/ Program Management	MIPR	TARDEC/TACOM : Warren, Michigan	2.241	-		-		-		-		-	0.000	2.241	-	
Subtotal			2.241	-	-	-	-	-	-	-	-	0.000	2.241	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	
Operational Efficiency	MIPR	TARDEC, Warren, Michigan : TARDEC, Warren, Michigan	0.319	-		-		-		-		-	0.000	0.319	-	
Operational Energy/Duty Cycle Monitoring	TBD	TBD : TBD	0.987	-		-		-		-		-	0.000	0.987	-	
Non Nuclear Soil Density Set Testing	TBD	TARDEC : Warren, MI	0.050	-		-		-		-		-	0.000	0.050	-	
Subtotal			1.356	-	-	-	-	-	-	-	-	0.000	1.356	N/A		
Project Cost Totals			38.456	3.270	0.000	-	-	-	-	-	-	0.000	41.726	N/A		
Remarks																

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H01 / <i>Combat Engineer Eq Ed</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
CEVT	[REDACTED]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H01 / <i>Combat Engineer Eq Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
CEVT	2	2019	1	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) H02 / <i>Tactical Bridging - Engineering 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
H02: <i>Tactical Bridging - Engineering Development</i>	-	7.050	44.452	12.398	-	12.398	24.154	8.333	0.000	0.000	0.000	96.387
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports the engineering, prototyping and manufacturing development for products transitioning to procurement for future force bridge systems and support equipment. Funding supports development and testing of the Bridge Supplemental Set (BSS) and tests associated with the Low Rate Initial Production (LRIP) phase of the Line of Communication Bridge (LOCB). This project also funds efforts to upgrade and modernize the Bridging Product Management portfolio through the development of new systems such as the Bridge Health Monitoring System, and the Family of Higher Military Load Classification Bridges (FoHMLC-B).

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: Line of Communication Bridge (LOCB)</p> <p>Description: Funding requested for development and testing of higher Military Load Classification (MLC) modular Line of Communication Bridging with the mobility to span fixed or float gaps spanning 50 to 800 meters wide. Actions include bridge structural strength analysis, performance assessments, and Production Qualification Testing (PQT) of the Line of Communication Bridge (LOCB) system.</p> <p>FY 2020 Plans: Funding supports commercial bridge launch testing, First Article Testing (FAT) and Initial Operational Test and Evaluation (IOT&E) of the Line of Communication Bridge (LOCB) system.</p> <p>FY 2021 Base Plans: Funding supports the purchase of MLC 80/110 commercial bridging test assets, structural strength and durability testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2020 to FY 2021 funding increase due to purchase of MLC 80/110 LOCB commercial bridging test assets for program of record testing.</p>	1.978	2.011	7.624	-	7.624
<p>Title: Bridge Supplemental Set (BSS)</p> <p>Description: Funding to develop a multi-functional, consolidated engineering set consisting of an anchorage system, access/egress traction improvement matting, power generation, tools, and a float bridge protection</p>	3.012	2.361	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>device. The BSS is targeted for use with multiple tactical bridging systems to include the Improved Ribbon Bridge (IRB). It will also increase the capability of the Multi-Role Bridge Company (MRBC).</p> <p>FY 2020 Plans: Funding supports remaining prototype development costs, Initial Operational Testing (IOT) and Logistics Demonstration events.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2020 to FY 2021 decrease because no RDTE funding is required for BSS in FY 2021. Procurement funding is being requested for BSS production in FY 2021 on OPA line G06520.</p>					
<p>Title: Family of Higher Military Load Capacity Bridges</p> <p>Description: Funding provided to develop the Family of Higher Military Load Classification Bridges (FoHMLC-B). FoHMLC-B program will develop future bridging systems to replace the Heavy Assault Scissor Bridge (HASB) carried on the Joint Assault Bridge(JAB) launcher, Dry Support Bridge (DSB) and Improved Ribbon Bridge (IRB) sections/components to support the heavier weights of next generation combat vehicles.</p> <p>FY 2020 Plans: Funding supports the Armored Vehicle Launched Bridge (AVLB), Improved Ribbon Bridge (IRB) and Dry Support Bridge (DSB) up-weight prototype development, bridge overload testing and test facility bridge crossing simulator upgrades to support prototype testing in FY 2021.</p> <p>FY 2021 Base Plans: Funding supports Dry Support Bridge and Improved Ribbon Bridge test asset max weight and test to fail analysis as well as Heavy Assault Scissor Bridge (HAS-B) up-weight prototype testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2020 to FY 2021 funding decrease due to program transition from purchasing prototypes and test assets to max weight and up-weight durability and structural strength testing.</p>	2.060	38.061	4.774	-	4.774
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans:</p>	-	2.019	-	-	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding transferred in accordance with Title 15 USC ?638					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i>					
Funding transferred in accordance with Title 15 USC ?638					
Accomplishments/Planned Programs Subtotals	7.050	44.452	12.398	-	12.398

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>
• G06520: BRIDGE	-	17.966	32.493	-	32.493	43.987	-	-	-	0.000	94.446
SUPPLEMENTAL SET											
• G82404: LINE OF	81.219	64.705	10.545	50.400	60.945	10.533	13.516	-	-	0.000	230.918
COMMUNICATION BRIDGE LOCB											

Remarks

D. Acquisition Strategy
The acquisition strategy is for Research Development Test & Evaluation efforts to support prototyping, testing and follow-on production efforts for future Bridging systems.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
System Engineering and Program Management	MIPR	Various : Various	-	1.543	Oct 2018	2.278	Oct 2019	1.386	Oct 2020	-		1.386	Continuing	Continuing	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		2.019		-		-		-	0.000	2.019	-
Subtotal			-	1.543		4.297		1.386		-		1.386	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Line of Communication Bridge - Acrow MLC 80/110 150M	SS/FFP	ACC Warren : Warren, MI	-	-		-		2.100	Nov 2020	-		2.100	0.000	2.100	-
Line of Communication Bridge - Mabey MLC 80/110 150M	SS/FFP	ACC Warren : Warren, MI	-	-		-		2.300	Nov 2020	-		2.300	0.000	2.300	-
Bridge Supplemental Set - Anchorage Development and Prototype Assets	WR	Tobyhanna Army Depot : Tobyhanna, PA	-	2.287	Nov 2018	-		-		-		-	0.000	2.287	-
Family of High Military Load Capacity Bridges - ERDC Bridge Gap Analysis	MIPR	U.S. Army Engineer Research and Development Center (ERDC) : Vicksburg, MS	-	1.150	Jan 2019	-		-		-		-	0.000	1.150	-
Family of High Military Load Capacity Bridges - AVLB Test / Upgrade Study	MIPR	TARDEC : Warren, MI	-	0.100	Jan 2019	-		-		-		-	0.000	0.100	-
Family of High Military Load Capacity Bridges - DSB/IRB EMD Test Assets	TBD	TBD : TBD	-	-		3.817	Apr 2020	-		-		-	0.000	3.817	-
Family of High Military Load Capacity Bridges -	TBD	TBD : TBD	-	-		1.717	Nov 2019	-		-		-	0.000	1.717	-

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				H02 / Tactical Bridging - Engineering Development							
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
IRB - Upweight Overload Modeling															
Family of High Military Load Capacity Bridges - AVLB Upweight OTA Award	TBD	TBD : TBD	-	-		27.917	Dec 2019	-		-		-	0.000	27.917	-
Subtotal			-	3.537		33.451		4.400		-		4.400	0.000	41.388	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
Bridge Lab Spt	MIPR	TARDEC - Bridge Lab : Warren, MI	-	0.783	Oct 2018	0.616	Oct 2019	0.752	Nov 2020	-		0.752	Continuing	Continuing	-
Test Facility SANG / ATEC Upgrades - HMLC	MIPR	TARDEC - Bridge Lab : Warren, MI	-	-		1.816	Oct 2019	-		-		-	0.000	1.816	-
Prototype/EMD Bridge Test Asset Transportation	TBD	TAC Code : TBD	-	-		0.256	Oct 2019	0.260	Jan 2021	-		0.260	Continuing	Continuing	-
Subtotal			-	0.783		2.688		1.012		-		1.012	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
Line of Communication Bridge - Survivability Testing	MIPR	U.S. Army Engineer Research and Development Center (ERDC) : Vicksburg, MS	-	0.040	Jan 2019	-		-		-		-	0.000	0.040	-
Line of Communication Bridge - Component Fatigue Testing	MIPR	U.S. Army Engineer Research and Development Center	-	1.007	Jan 2019	-		-		-		-	0.000	1.007	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</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				
		(ERDC) : Vicksburg, MS														
Line of Communication Bridge - Fast Water Analysis	MIPR	United States Army Materiel Systems Analysis Activity (AMSAA) : Aberdeen Proving Ground, MD	-	0.140	Jan 2019	-		-		-		-	0.000	0.140	-	
Line of Communication Bridge - UMR Launch and Wet Gap Testing	MIPR	Army Test and Evaluation Command (ATEC) : Aberdeen Proving Ground, MD	-	-		0.516	Nov 2019	-		-		-	0.000	0.516	-	
Line of Communication Bridge - First Article Testing	TBD	TBD : TBD	-	-		0.566	Mar 2020	-		-		-	0.000	0.566	-	
Line of Communication Bridge - MLC80-110 Durability Testing	MIPR	U.S. Army Engineer Research and Development Center (ERDC) : Vicksburg, MS	-	-		-		1.500	Feb 2021	-		-	1.500	0.000	1.500	
Line of Communication Bridge - MLC80/110 Structural Strength Testing	MIPR	United States Army Materiel Systems Analysis Activity (AMSAA) : Aberdeen Proving Ground, MD	-	-		-		0.500	Apr 2021	-		-	0.500	0.000	0.500	
Bridge Supplemental Set - IOT / Log Demo	MIPR	TBD : TBD	-	-		1.617	Jan 2020	-		-		-	0.000	1.617	-	
Family of High Military Load Capacity Bridges - AVL B Upweight Prototype Testing	TBD	TBD : TBD	-	-		1.317	Jul 2020	0.400	Jun 2021	-		-	0.400	Continuing	Continuing	-
Family of High Military Load Capacity Bridges - DSB - EMD Testing - Max Weight - Test to Fail	MIPR	Bridge Lab - U.S. Army Combat Capability Development Center	-	-		-		1.600	Jan 2021	-		-	1.600	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering 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				
Line Of Communication Bridge POR/ONS																																
Line Of Communication Bridge UMR Live Launch Crossing																																
	[Redacted]																															
	[Redacted]																															
Line Of Communication Bridge Durability Testing																																
					[Redacted]																											
					[Redacted]																											
Line of Communication Bridge UMR Production																																
									[Redacted]																							
Line Of Communication Bridge Milestone "C"																																
													[Redacted]																			
Line of Communication Bridge Transportability Dev																																
													[Redacted]																			
Line Of Communication Bridge PQT/OT																																
													[Redacted]																			
Line of Communication COTS Manual Dev/Verification																																
													[Redacted]																			
Line of Communication Bridge POR Production																																
																	[Redacted]															
Line Of Communication Bridge FMR																																
																					[Redacted]											
Bridge Supplemental Set (BSS)																																
BSS Make-or-Buy Decision																																
																									[Redacted]							
BSS Technical Data Package Verification																																
																									[Redacted]							

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering 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
BSS Prototype Development					 BSS Prototype Development																							
BSS Milestone C Decision					 BSS MS C																							
BSS Production													 BSS Production															
BSS Log Demo													 BSS Log Demo															
Bridge Supplemental Set IOTE													 BSS IOTE															
Family of High Military Load Capacity Bridging																												
Family of High Military Load Capacity Bridgi Capability Dev D	 FoHMLC CDD																											
Family of High Military Load Capacity Bridging AVLB Test					 FoHMLC AVLB Test																							
Family of High Military Load Capacity Bridging Material Dev Decision					 FoHMLC MDD																							
Family of High Military Load Capacity Bridging Milestone "B"													 FoHMLC MSB															
Family of High Military Load Capacity Bridging HASB OTA Award					 FoHMLC HASB OTA Award																							
Family of High Military Load Capacity Bridging DSB OTA Award													 FoHMLC DSB OTA Award															
Family of High Military Load Capacity Bridging IRB OTA Award													 FoHMLC IRB OTA Award															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering 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					
Family of High Military Load Capacity Bridging Prototype Development HASB/IRB/DSB																																	
Family of High Military Load Capacity Bridging Log Development HASB/IRB/DSB																																	
Family of High Military Load Capacity Bridging Prototype Testing HASB/IRB/DSB																																	
Family of High Military Load Capacity Bridging Capabilities Decision Doc									6 FoHMLC CDD																								
Family of High Military Load Capacity Bridging Milestone "C"																	11 FoHMLC MSC																
Family of High Military Load Capacity Bridging Low Rate Initial Production - HASB																	12 FoHMLC LRIP - HASB																
Family of High Military Load Capacity Bridging Full Rate Production - HASB																					13 FoHMLC FRP - HASB												
Family of High Military Load Capacity Bridging Low Rate Initial Production - DSB																													14 FoHMLC LRIP - Up-We				
Family of High Military Load Capacity Bridging Low Rate Initial Production - IRB																													15 FoHMLC LRIP - Up-We				

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Line Of Communication Bridge POR/ONS	2	2012	4	2021
Line Of Communication Bridge UMR Live Launch Crossing	1	2019	4	2019
Line Of Communication Bridge Durability Testing	1	2020	3	2020
Line of Communication Bridge UMR Production	3	2019	4	2021
Line Of Communication Bridge Milestone "C"	2	2021	2	2021
Line of Communication Bridge Transportability Dev	4	2020	4	2021
Line Of Communication Bridge PQT/OT	3	2021	4	2022
Line of Communication COTS Manual Dev/Verification	3	2021	4	2022
Line of Communication Bridge POR Production	1	2022	4	2023
Line Of Communication Bridge FMR	4	2022	4	2022
Bridge Supplemental Set (BSS)	2	2019	2	2019
BSS Make-or-Buy Decision	3	2019	3	2019
BSS Technical Data Package Verification	2	2019	4	2019
BSS Prototype Development	3	2019	3	2020
BSS Milestone C Decision	3	2020	3	2020
BSS Production	3	2020	1	2023
BSS Log Demo	4	2020	4	2020
Bridge Supplemental Set IOTE	4	2020	1	2021
Family of High Military Load Capacity Bridging	1	2018	2	2022
Family of High Military Load Capacity Bridgi Capability Dev Document	4	2018	2	2020
Family of High Military Load Capacity Bridging AVLB Test	1	2020	2	2020
Family of High Military Load Capacity Bridging Material Dev Decision	3	2020	3	2020

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
Family of High Military Load Capacity Bridging Milestone "B"	3	2021	3	2021
Family of High Military Load Capacity Bridging HASB OTA Award	4	2020	4	2020
Family of High Military Load Capacity Bridging DSB OTA Award	1	2022	1	2022
Family of High Military Load Capacity Bridging IRB OTA Award	1	2022	1	2022
Family of High Military Load Capacity Bridging Prototype Developmnt HASB/IRB/DSB	4	2020	4	2023
Family of High Military Load Capacity Bridging Log Development HASB/IRB/DSB	2	2020	3	2024
Family of High Military Load Capacity Bridging Prototype Testing HASB/IRB/DSB	1	2023	3	2024
Family of High Military Load Capacity Bridging Capabilities Decision Doc	2	2021	2	2021
Family of High Military Load Capacity Bridging Milestone "C"	2	2023	2	2023
Family of High Military Load Capacity Bridging Low Rate Initial Production - HAS	2	2023	2	2023
Family of High Military Load Capacity Bridging Full Rate Production - HASB	3	2024	3	2024
Family of High Military Load Capacity Bridging Low Rate Initial Production - DSB	2	2025	2	2025
Family of High Military Load Capacity Bridging Low Rate Initial Production - IRB	2	2025	2	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev				Project (Number/Name) L39 / Field Sustainment Support Ed			
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
L39: Field Sustainment Support Ed	-	2.674	1.675	1.718	-	1.718	1.771	1.805	1.798	1.798	0.000	13.239
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports the Engineering and Manufacturing Development (EMD) of critical capabilities for cargo aerial delivery for identified theater distribution and services capability gaps, improve unit sustainability, and increase combat effectiveness. Project supports the demonstration of engineering development models and Type Classification of cargo parachutes, airdrop containers and other aerial delivery equipment to improve safety, effectiveness, and efficiency of airborne operations. This project develops critical enablers that support the Army in executing future movement and maneuver operations and distributed sustainment support and the Army's Modular Force Capabilities by maintaining readiness through fielding and integrating new equipment. This project also ensures Army Expeditionary Forces are capable of rapid deployment by providing aerial delivery initiatives. This project also ensures Army Expeditionary Forces are capable of rapid deployment through aerial delivery initiatives and reduces sustainment requirements, related Combat Support/Combat Service Support (CS/CSS) demands in lift, combat zone footprint, and costs for logistical support.

Funding supports modernization of current cargo aerial delivery systems by investigating technology insertions that increase accuracy, collision avoidance, in flight communications, and reliability. Funding also supports developing initial prototypes to enable refinement of operational requirements and early user feedback to support future sustainment and operational movement concepts.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Extracted High and Low High Speed Container Delivery System (EHLSCDS)	0.265	-	-	-	-
Description: Provides a high speed (230 knot) low altitude (375 A AGL) capability for up to eight Container Delivery Systems (CDS) to enhance aircraft and aircrew safety while improving accuracy and reducing dispersion for receiving ground units.					
Title: Joint Precision Airdrop System-2K Block 1 upgrade (JPADS-BLK1)	1.261	-	-	-	-
Description: Supports increasing the technological and design maturity, testing, and integration of several key initiatives focused on: maintaining system accuracy and reliability in Global Positioning System (GPS) denied environments; collision avoidance; more precise position determination software; and improved Guidance Navigation and Control (GN&C) hardware.					
Title: Rapid Rigging and DeRigging Airdrop System (RRDAS)	1.148	1.599	1.718	-	1.718

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L39 / <i>Field Sustainment Support Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Description: Reduces rigging times while also providing the capability to rapidly de-rig loads on the drop zone. This will reduce the lead time to prepare Low Velocity Airdrop Load (LVADS) loads while also increasing the survivability of receiving ground forces by ensuring the airdrop loads (to include weapon systems, prime movers, trailers, etc.) are quickly de-rigged and made operational.</p> <p>FY 2020 Plans: Conduct Critical Design Review and initiate Developmental Testing</p> <p>FY 2021 Base Plans: Conduct down selection, limited user evaluation and initiate Developmental Testing.(DT).</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funds increased to support Developmental Testing.</p>					
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638</p>	-	0.076	-	-	-
Accomplishments/Planned Programs Subtotals	2.674	1.675	1.718	-	1.718

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
• K39: <i>Field Sustainment Support Ad</i>	2.234	-	0.000	-	0.000	-	-	-	-	0.000	2.234
• MA7806: <i>Precision Airdrop</i>	5.731	2.040	0.000	2.040	2.040	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy
The acquisition strategy is to accelerate product development and testing to transition into production.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L39 / <i>Field Sustainment Support Ed</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Project Management Support	Various	PM FSS : Natick, MA	5.354	0.500		0.325		0.400		-		0.400	0.000	6.579	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.076		-		-		-	0.000	0.076	-
Subtotal			5.354	0.500		0.401		0.400		-		0.400	0.000	6.655	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ALVADS-L&H	Various	Various : Various	17.152	-		-		-		-		-	0.000	17.152	Continuing
EHLSCDS	Various	Various : Various	0.450	0.265		-		-		-		-	0.000	0.715	-
JPADS	Various	Various : Various	1.465	0.388		-		-		-		-	0.000	1.853	-
RRDAS	Various	Various : Various	-	0.948		0.824		0.418		-		0.418	0.000	2.190	-
Subtotal			19.067	1.601		0.824		0.418		-		0.418	0.000	21.910	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EHLSCDS	Various	Various : Various	0.424	-		-		-		-		-	0.000	0.424	-
ALVADS	Various	Various : Various	0.050	-		-		-		-		-	0.000	0.050	-
JPADS	Various	Various : Various	0.200	-		-		-		-		-	0.000	0.200	-
Subtotal			0.674	-		-		-		-		-	0.000	0.674	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L39 / <i>Field Sustainment Support Ed</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
Complete Milestone C/TC STD deliverables on EHLSCDS	█																											
Complete Milestone C/TC-STD EHLSCDS					▲ 1																							
JPADS Block I upgrade PQT and OT	█																											
Complete Milestone B on RRDAS					▲ 2																							
Develop and fabricate RRDAS demonstration validation prototypes	█																											
Conduct DV testing for Rapid Rigging De Rigging Airdrop System (RRDAS)					█																							
Conduct DT/OT for RRDAS									█																			
Complete Milestone C for RRDAS													▲ 3															
Initiate Phase II RRDAS													█				█				█							
Conduct DT and OT for ALVADS DRAS capability	█																											
Develop and Fabricate RRDAS - Phase II Prototypes													█															
Conduct DT and OT for RRDAS Phase II																	█				█							
Complete MS C/TC STD deliverables on RRDAS Phase II																					█							

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L39 / <i>Field Sustainment Support Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Complete Milestone C/TC STD deliverables on EHLSCDS	4	2018	2	2019
Complete Milestone C/TC-STD EHLSCDS	4	2019	4	2019
JPADS Block I upgrade PQT and OT	1	2018	3	2019
Complete Milestone B on RRDAS	2	2020	2	2020
Develop and fabricate RRDAS demonstration validation protoypes	3	2019	1	2020
Conduct DV testing for Rapid Rigging De Rigging Airdrop System (RRDAS)	2	2020	4	2020
Conduct DT/OT for RRDAS	2	2021	3	2022
Complete Milestone C for RRDAS	4	2022	4	2022
Initiate Phase II RRDAS	1	2022	4	2025
Conduct DT and OT for ALVADS DRAS capablity	3	2018	2	2019
Develop and Fabricate RRDAS - Phase II Prototypes	3	2022	2	2023
Conduct DT and OT for RRDAS Phase II	1	2024	2	2025
Complete MS C/TC STD deliverables on RRDAS Phase II	3	2025	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020			
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>					Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</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	
L41: <i>Water And Petroleum Distribution - Ed</i>	-	8.366	7.540	10.988	-	10.988	8.492	7.492	6.494	5.495	0.000	54.867	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

This project supports engineering and manufacturing development efforts as well as the Production Qualification Testing (PQT) and First Article Testing (FAT) efforts to provide all services with ample supply of clean fuel and water, supporting all types of missions. The Army has the mission to supply fuel for all land-based forces, including the Marines and the Air Force, and for supplying bulk drinking water to Soldiers. These programs enable the Army to improve maneuver sustainment operations to meet the demands of Army units and the Future Force. The mission includes receiving and transferring petroleum from trucks, ships, pipelines, and permanent and temporary storage facilities; moving petroleum from storage to and within corps and division areas; fuel quality surveillance testing; and dispensing in support of tactical operations, including rapid refueling of aircraft. This project also supports development and analysis of technologies designed to increase survivability of petroleum and water systems that may operate or be transported in hostile environments. The mission covers water purification and waste water treatment, reutilization, storage, distribution, alternative water source acquisition, disposal, and quality control. These research and development missions support the development and enhancement of rapidly deployed Petroleum and Water equipment which enables the Army to achieve its vision by providing a highly mobile and self-sustaining systems in hostile joint operations areas. Programs funded on this Project includes: Tactical Fuel Distribution System (TFDS), Bulk Fuel Distribution System (BFDS), Petroleum Expeditionary Analysis Kit (PEAK), Water Bison and Water Bison Light, Water Storage and Distribution System (WSDS) 40,000 gallon and 100,000 gallon sets, 3K Tactical Water Purification System (TWPS), Early Entry Fluid Distribution System (E2FDS) and Pipeline Trace Tool - Software Development, Modular Tactical Retail Refueling System (MTRRS), and Load Handling System (LHS) - Compatible Water Tank-rack System (HIPPO).

This Project provides for the modernization of current Petroleum and Water System fleets by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Victory Architecture, autonomous operations and other emerging technologies. Funding also supports developing and testing initial prototypes, and production representative articles to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts. Funding supports non-traditional and middle tier acquisitions to include Other Transaction Authority (OTA) and 804.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Water Bison	0.045	0.289	2.731	-	2.731
Description: The Unit Water Trailer (Water Bison) is a replacement for the 400 gallon Water Buffalo. A second variant, the Water Bison Lite, is also required. The Water Bison consists of a baffled, 500 gallon capacity tank and the Water Bison Lite consists of a baffled, 250 gallon capacity tank. They provide the modular force an efficient method of transporting a full day of supply (DOS) of bulk potable water. Both systems include freeze protection that are mounted on a trailer and include all hoses and fittings necessary to dispense water by					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>means of gravity flow. The Water Bison and Water Bison Lite will be used by units at all echelons. The Family of Medium Tactical Vehicles (FMTV) shall be capable of towing this system.</p> <p>FY 2020 Plans: Prepare Other Transaction Authority (OTA) Request for Prototype Proposal (RPP) contract. Milestone B approval.</p> <p>FY 2021 Base Plans: Award Other Transaction Authority (OTA) prototype contract, conduct prototype testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The FY 2021 increase is for OTA award and testing.</p>					
<p>Title: Early Entry Fluid Distribution System (E2FDS).</p> <p>Description: The Early Entry Fluid Distribution System (E2FDS) is a new materiel system that enhances the Inland Petroleum Distribution System (IPDS) pipeline and rapidly establishes new or extends existing pipeline traces. It is a high throughput flexible conduit system for the transport of bulk petroleum or water across the battlefield. It is rapidly-emplaced and capable of a throughput of 850,000 gallons of fuel or 650,000 gallons of raw non-potable water, per a 20 hour operational day through a trace up to 50 miles long. The E2FDS requires little to no engineer support to emplace the conduit or pump stations. Pump stations are fully automated and centrally controlled.</p> <p>FY 2020 Plans: Conduct Log Demo testing and complete Production Qualification Testing (PQT).</p> <p>FY 2021 Base Plans: Limited User Test (LUT), Conditional Material Release documentation and Full Rate Production (FRP).</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The FY 2021 increase is to complete E2FDS LUT.</p>	2.375	1.562	1.707	-	1.707
<p>Title: Modular Tactical Retail Refueling System (MTRRS)</p> <p>Description: The Mobile Tactical Retail Refueling System (MTRRS) will serve as a bulk fuel carrier and retail dispenser for military vehicles and ground support equipment, providing fuel in all operational environments. The MTRRS allows for different configurations or transport platforms including Medium Tactical Vehicle (MTV) cargo trucks, MTV Trailers, and the Palletized Load System (PLS) flat-racks. MTRRS ground operation is</p>	1.350	0.048	0.950	-	0.950

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>possible by using Material Handling Equipment (MHE) to remove the MTRRS from the transport platform. The MTRRS provides fuel storage (900 Gallons (T), 1200 Gallons (O)), filtration, and unit-level retail capabilities with the ability to refuel ground vehicles, ground equipment, and fuel containers. MTRRS includes an electric pump that will provide a minimum flow rate of 17 Gallons per Minute (GPM) of filtered fuel. The prime mover or a separate generator provides power using an included North Atlantic Treaty Organization (NATO) slave cable.</p> <p>FY 2020 Plans: Support Costs. Start Production Qualification Testing (PQT)</p> <p>FY 2021 Base Plans: Conduct Production Qualification Testing (PQT) , Technical Manual (TM) and provisioning development and Full Rate Production (FRP).</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The FY 2021 increase is for testing.</p>					
<p>Title: Petroleum Expeditionary Analysis Kit (PEAK)</p> <p>Description: The Petroleum Expeditionary Analysis Kit (PEAK) replaces Aviation Fuels Contamination Test Kit (AFCTK) and provides fuel quality surveillance within all Brigade Combat Teams and Support Brigades. It is a stand-alone system that will rapidly verify petroleum products' suitability for use at point of consumption. The PEAK will evaluate all kerosene-based and diesel fuels used in ground systems and aircraft. It will provide the field with the capability to determine fuel type, grade, and additives.</p> <p>FY 2020 Plans: Award Other Transaction Authority (OTA) Request for Prototype Proposal (RPP). Milestone B approval. Conduct start of work meeting and preparation of asset delivery.</p> <p>FY 2021 Base Plans: Leverage a two phase Indefinite Delivery Indefinite Quantity (IDIQ) contract approach. Execute Phase I which will include delivery of one PEAK test asset by each contractor (up to five). Phase II will include down selection to one vendor for additional production delivery orders.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The FY 2021 increase is due to contract award for test assets and testing.</p>	0.300	0.450	1.000	-	1.000
<p>Title: Tactical Fuel Distribution System (TFDS)</p>	0.045	0.072	2.800	-	2.800

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Description: The Tactical Fuel Distribution System (TFDS) provides theater bulk petroleum distribution to maximize throughput in order to support early entry, buildup, and onward movement of forces. It replaces the M967 and M969 tanker trailers, which are nearing the end of its useful life. The TFDS consists of a 5,000 gallon line haul tanker trailer, pulled primarily by the M1088 tractor. It shall be capable of retail fuel distribution and able to travel on unimproved roads and provides support from the Theater Army to Echelons Above Brigade (EAB).</p> <p>FY 2020 Plans: Continue Market Research. Milestone B document development, Request for Prototype Proposal (RPP) development.</p> <p>FY 2021 Base Plans: Award OTA and begin developmental testing (DT) .</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The FY 2021 increase is to prepare award Other Transaction Authority (OTA).</p>					
<p>Title: Load Handling System (LHS) - Compatible Water Tankrack System (HIPPO)</p> <p>Description: Load Handling System (LHS) - Compatible Water Tank Rack System (HIPPO) replaces the Forward Area Water Point Supply system (FAWPSS) and Semi-Trailer Mounted Fabric Tank (SMFT). It provides capability to receive, store, transport, and distribute bulk and unit retail water to the warfighter. The HIPPO consists of a 2,000 gallon potable water tank in a 20' ISO frame with integrated pump, engine, alternator, hose reel, freeze prevention, and fill stand. The HIPPO is critical for sustaining the soldier and accomplishing combat service support missions at all echelons. Legacy water distribution systems do not provide the mobility required to achieve unit distribution goals for the current and objective force.</p> <p>FY 2020 Plans: Award Other Transaction Authority (OTA) agreements and conduct prototype fly-off test.</p> <p>FY 2021 Base Plans: Funds are required to conduct testing on three prototypes and Request for Production Proposal (RFP) and evaluation.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The FY 2021 decrease is due to completion of prototype fly-off test in preparation of production contract.</p>	-	1.682	0.800	-	0.800
<p>Title: Bulk Fuel Distribution System (BFDS)</p>	0.045	0.667	0.500	-	0.500

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Description: The Bulk Fuel Distribution System (BFDS) provides theater bulk petroleum distribution to maximize throughput to support early entry, buildup, and onward movement of forces. The BFDS consists of a 7,500 gallon line haul tanker trailer, pulled primarily by the M915A3 or later version tractor. The BFDS provides bulk distribution between large fuel storage areas and will include a automated level gauge sensor for mission command reporting and providing asset and in-transit visibility. The BFDS is not capable of off-road or retail operations.</p> <p>FY 2020 Plans: Award Other Transaction Authority (OTA), conduct test and market research for production. Conduct start of work meeting and preparation of asset delivery.</p> <p>FY 2021 Base Plans: Developmental Testing (DT).</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The FY 2021 decrease is due to completion of OTA award and market research for production. First Article Testing (FAT) is the only planned effort in FY 2021.</p>					
<p>Title: 3K Tactical Water Purification System (TWPS).</p> <p>Description: The 3,000 (3k) Gallons per Hour (GPH) Tactical Water Purification System (TWPS) replaces the legacy 3,000 (3k) GPH Reverse Osmosis Water Purification Unit (ROWPU), which is currently the largest water purification capability in the Army's inventory and is nearing the end of its useful life. The 3k TWPS shall be the sole bulk water capability supporting Echelons Above Brigade (EAB) and will be the primary water purification capability for laundry and shower facilities. Purifies up to 3,000 GPH from any water source, including 60,000 milligrams per liter, Total Dissolved Solids (TDS) salt water and Chemical Biological Radiological and Nuclear (CBRN) contaminated sources. Consists of feed water pumps, hoses, media and cartridge filters, high pressure pump, reverse osmosis elements, 3,000 gallon water storage and distribution system, and control panel. Supports all tactical water missions, is Load Handling System (LHS)/Palletized Load System (PLS) truck compatible via Container Handling Unit (CHU)/ Enhanced Container Handling Unit (E-CHU).</p> <p>FY 2020 Plans: Pending authority FY 2020 funds will support developmental efforts.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	1.418	0.072	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Program funding for 3K TWPS is deferred. Milestone B for program moved to a later fiscal year pending future funding adjustments					
<p>Title: PM Support</p> <p>Description: Program Management (PM) Support is matrix support that includes PM travel expenses and systems engineering oversight required to manage Research, Development, Technology and Engineering (RDT&E) projects. Includes salaries and travel for the support of programs within this Project.</p> <p>FY 2020 Plans: Funds matrix support, travel, and general oversight efforts.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 PM support is included under each system support.</p>	2.788	2.355	-	-	-
<p>Title: Water and Storage System (WSDS)</p> <p>Description: Water Storage Distribution System (WSDS) provides the large capacity capability that is tailorable in receiving, storing, and issuing to all bulk water systems in the Army inventory. The WSDS stores and issues potable water in support of individual consumption, medical treatment, Chemical, Biological, Radiological, and Nuclear (CBRN) decontamination. It is used in conjunction with the 1,500 gph Tactical Water Purification System (1.5K TWPS) or the 3,000 gph Reverse Osmosis Water Purification Unit (3K ROWPU). It is the only program of record that is designed to store bulk water in the quantities needed for the Warfighter. Both the 40,000 gallon and the 100,000 gallon WSDS are containerized. The 40K WSDS consists of the hypo-chlorination unit, 125 GPM pump, two 20K collapsible water tanks, triple container. The 100K WSDS will take the place of two 40K systems in the Composite Supply Companies.</p> <p>FY 2021 Base Plans: Achieve Milestone C, contract award and testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The FY 2021 supports "New Start" increase for contract award and testing.</p>	-	-	0.500	-	0.500
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans:</p>	-	0.343	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding transferred in accordance with Title 15 USC ?638					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i>					
Funding transferred in accordance with Title 15 USC ?638					
Accomplishments/Planned Programs Subtotals	8.366	7.540	10.988	-	10.988

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
• MA6000: <i>Distribution Systems, Petroleum & Water</i>	26.471	84.527	78.448	4.374	82.822	57.952	34.371	38.086	42.678	0.000	366.907
• D02001: <i>Semitrailers, tankers</i>	-	-	17.082	-	17.082	35.963	35.963	40.059	40.060	0.000	169.127

Remarks

D. Acquisition Strategy

Develop engineering prototypes for the Petroleum Tankers, Early Entry Fluid Distribution System (E2FDS) and Load Handling System (LHS) - Compatible Water Tank Rack System (HIPPO) select Non-Development Item (NDI) based on market surveys and proposals from industry. Conduct industry days and based on additional market research will award either competitive or sole source contracts. Conduct Integrated Product Team (IPT's) and develop acquisition strategies for Water Bison and Water Bison Light, Petroleum Expeditionary Analysis Kit (PEAK), Tactical Fuel Distribution System (TFDS), Bulk Fuel Distribution System (BFDS) and Water Storage and Distribution System (WSDS), Mobile Tactical Retail Refueling System (MTRRS). Conduct developmental and operational testing where applicable for Water Bison and Water Bison Light, E2FDS, Petroleum Tankers, MTRRS, Water Storage and Distribution Systems (WSDS) 40,000 gallon and 100,000 gallon sets, PEAK, HIPPO. Conduct Source Selection Evaluation Boards (SSEBs) within the Petroleum and Water Systems portfolio. Develop documentation in support of Milestone Decisions. Will award Other Transactional Agreements (OTAs) or traditional Federal Acquisition Regulation (FAR) based contracts based on market research, industry capabilities and program risks.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) L41 / Water And Petroleum Distribution - Ed
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PM Support	MIPR	Various TACOM : Warren, MI	-	2.788	Dec 2018	2.360	Jan 2020	-		-		-	0.000	5.148	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.343		-		-		-	0.000	0.343	-
Subtotal			-	2.788		2.703		-		-		-	0.000	5.491	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Water Bison	C/FFP	TBD : TBD	-	-		-		2.300	Nov 2020	-		2.300	0.000	2.300	-
Early Entry Fluid Distribution System (E2FDS)	MIPR	APG : Aberdeen Proving Ground, MD	-	0.014	Feb 2019	-		-		-		-	0.000	0.014	-
Modular Tactical Retail Refueling System (MTRRS)	MIPR	Keweenaw Research Center (KRC) : Houghton, Mleew	0.317	0.850	Apr 2019	-		-		-		-	0.000	1.167	-
Petroleum Expeditionary Analysis Kit (PEAK)	C/FFP	TBD : TBD	-	-		-		0.500	Nov 2020	-		0.500	0.000	0.500	-
Tactical Fuel Distribution System (TFDS)	C/FFP	TBD : TBD	-	-		-		2.058	Nov 2020	-		2.058	0.000	2.058	-
3K Tactical Water Purification System (3K TWPS)	C/FFP	TACOM : Warren, MI	-	1.023	Jan 2019	-		-		-		-	0.000	1.023	-
Bulk Fuel Distribution System (BFDS)	C/FFP	TBD : TBD	-	-		-		0.175	Nov 2020	-		0.175	0.000	0.175	-
Subtotal			0.317	1.887		-		5.033		-		5.033	0.000	7.237	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) L41 / Water And Petroleum Distribution - Ed
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Water Bison	MIPR	TACOM : Warren, MI	0.045	0.045	Mar 2019	0.292		0.231	Oct 2020	-		0.231	0.000	0.613	-
Mobile Tactical Retail Refueling System (MTRRS)	MIPR	GVSC : Warren, MI	0.310	0.500	Jan 2019	-		-		-		-	0.000	0.810	-
Bulk Fuel Distribution System (BFDS)	MIPR	GVSC : Warren, MI	0.045	0.045	Mar 2019	0.670	Jan 2020	-		-		-	0.000	0.760	-
Petroleum Edpeditionary Analysis Kit (PEAK)	MIPR	GVSC : Warren, MI	-	0.300	Feb 2019	0.037	Oct 2019	0.275	Oct 2020	-		0.275	0.000	0.612	-
Tactical Fuel Distribution System (TFDS)	MIPR	GVSC : Warren, MI	-	0.045	Feb 2019	0.076	Feb 2020	0.233	Oct 2020	-		0.233	0.000	0.354	-
3K Tactical Water Purification System (3K TWPS)	MIPR	NAVSEA UARC Office : Washington, DC	0.470	0.395	Feb 2019	0.076	Feb 2020	-		-		-	0.000	0.941	-
Load Handling System (LHS) Compatible Water Tank Rack System (HIPPO)	MIPR	GVSC : Warren MI	-	-		-		0.370		-		0.370	0.000	0.370	-
Water Storage and Distribution	MIPR	GVSC : Warren, MI	-	-		-		0.218		-		0.218	0.000	0.218	-
Subtotal			0.870	1.330		1.151		1.327		-		1.327	0.000	4.678	N/A

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			
Water Bison	TBD	APG : Aberdeen Proving Ground, MD	-	-		-		0.200	Feb 2021	-		0.200	0.000	0.200	-
Early Entry Fluid Distribution System (E2FDS)	MIPR	APG : Aberdeen Proving Ground, MD	0.401	2.361	Jan 2019	1.566	Mar 2020	1.432	Mar 2021	-		1.432	0.000	5.760	-
Load Handling System (LHS) Compatible Water	MIPR	APG : Aberdeen Proving Ground, MD	-	-		1.686	Jan 2020	0.530	Feb 2021	-		0.530	0.000	2.216	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</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
Water Bison																												
Water Bison Materiel Development Decision (MDD)					2 MDD																							
Water Bison Other Transactional Authority Award									10 OTA Award																			
Water Bison Developmental Testing (DT)									DT																			
Water Bison Milestone C													18 MS C															
Water Bison Production Qualification Testing (PQT)													PQT															
Water Bison Initial Operational Test & Evaluation (IOT&E)													IOT&E															
Water Bison Full Rate Production (FRP)																	27 FRP											
Early Entry Fluid Distribution System (E2FDS)																												
E2FDS Developmental Testing / Production Qualification Testing (DT/PQT)					DT/PQT																							
E2FDS Milestone C									7 MS C																			
E2FDS Log Demo and Limited User Test (LUT)													Log Demo & LUT															
E2FDS Full Rate Production (FRP)													17 FRP															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</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
Modular Tactical Retail Refueling System (MTRRS)																												
MTRRS Developmental Testing (DT)				DT																								
MTRRS Milestone C					 MS C																							
MTRRS Production Qualification Test (PQT)									PQT																			
MTRRS Initial Operational Test & Evaluation (IOT&E)													IOT&E															
MTRRS Full Rate Production (FRP)									 FRP																			
MTRRS Full Materiel Release (FMR)													 FMR															
PEAK Reqs. Refinement & Tech. Dev.					Reqs. Refinement & Tech. Dev.																							
PEAK Materiel Development Decision (MDD)					 MDD Approved																							
PEAK Indefinite Delivery Indefinite Quantity (IDIQ) Contract									 IDIQ Award																			
PEAK System Testing													DT															
PEAK Milestone C													 MS C															
PEAK Production Award													 Production Award															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</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																								
PEAK Production Qualification Testing (PQT)													■ PQT																																							
PEAK Initial Operational Test & Evaluation (IOT&E)																																									■ IOT&E											
PEAK Full Rate Production (FRP)																																																				
Tactical Fuel Distribution System (TFDS)																																																				
TFDS Material Development Decision (MDD)																																																				
TFDS OTA Award																																																				
TFDS Developmental Testing (DT)									▲ 1 MDD				▲ 12 OTA				■ DT																																			
TFDS Milestone C																																									▲ 21 MS C											
TFDS Production Qualification Testing (PQT)																																																				
TFDS Initial Operational Test & Evaluation (IOT&E)																	■ IOT&E																																			
TFDS Full Rate Production (FRP)																																													▲ 29 FRP							
Load Handling System (LHS) - Compatible Water Tankrack System (HIPPO)																																																				
HIPPO Contract Award																																													▲ 4 Contract Award							

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</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
HIPPO Developmental Test (DT)								■																				
HIPPO Production Award											▲																	
HIPPO Production Qualification Testing (PQT)													■	■	■	■												
HIPPO Full Rate Production (FRP)																												
Bulk Fuel Distribution System (BFDS)																												
BFDS Materiel Development Decision (MDD)								▲																				
BFDS Other Transaction Authority (OTA) Award							▲																					
BFDS Developmental Testing (DT)								■																				
BFDS Milestone C													▲															
BFDS Production Qualification Testing (PQT)													■	■	■	■												
BFDS Initial Operational Test & Evaluation													■															
BFDS Full Rate Production (FRP)																												
3K Tactical Water Purification System (3K TWPS) RFP Develop																									■	■	■	■

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</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				
Water Storage Distribution System (WSDS)																																
WSDS Materiel Development Decision (MDD)																													5 MDD			
WSDS Milestone C																													15 MS C			
WSDS Contract Award																													15 Production Award			
WSDS Production Qualification Testing (PQT)																													PQT			
WSDS Full Rate Production (FRP)																													24 FRP			

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Water Bison	1	2022	4	2025
Water Bison Materiel Development Decision (MDD)	2	2020	2	2020
Water Bison Other Transactional Authority Award	1	2021	1	2021
Water Bison Developmental Testing (DT)	3	2021	4	2021
Water Bison Milestone C	1	2022	1	2022
Water Bison Production Qualification Testing (PQT)	3	2022	4	2022
Water Bison Initial Operational Test & Evaluation (IOT&E)	3	2022	4	2022
Water Bison Full Rate Production (FRP)	3	2023	3	2023
Early Entry Fluid Distribution System (E2FDS)	1	2017	4	2022
E2FDS Developmental Testing / Production Qualification Testing (DT/PQT)	1	2020	1	2021
E2FDS Milestone C	4	2020	4	2020
E2FDS Log Demo and Limited User Test (LUT)	4	2021	1	2022
E2FDS Full Rate Production (FRP)	4	2021	4	2021
Modular Tactical Retail Refueling System (MTRRS)	1	2017	4	2022
MTRRS Developmental Testing (DT)	3	2019	4	2019
MTRRS Milestone C	2	2020	2	2020
MTRRS Production Qualification Test (PQT)	4	2020	4	2021
MTRRS Initial Operational Test & Evaluation (IOT&E)	1	2022	1	2022
MTRRS Full Rate Production (FRP)	2	2021	2	2021
MTRRS Full Materiel Release (FMR)	2	2022	2	2022
PEAK Reqts. Refinement & Tech. Dev.	1	2020	4	2020
PEAK Materiel Development Decision (MDD)	2	2020	2	2020

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
PEAK Indefinite Delivery Indefinite Quantity (IDIQ) Contract	1	2021	1	2021
PEAK System Testing	2	2021	4	2021
PEAK Milestone C	2	2022	2	2022
PEAK Production Award	3	2022	3	2022
PEAK Production Qualification Testing (PQT)	4	2022	4	2022
PEAK Initial Operational Test & Evaluation (IOT&E)	4	2022	3	2023
PEAK Full Rate Production (FRP)	4	2023	4	2023
Tactical Fuel Distribution System (TFDS)	1	2020	1	2025
TFDS Material Development Decision (MDD)	1	2020	1	2020
TFDS OTA Award	1	2021	1	2021
TFDS Developmental Testing (DT)	3	2021	4	2021
TFDS Milestone C	2	2022	2	2022
TFDS Production Qualification Testing (PQT)	2	2023	3	2023
TFDS Initial Operational Test & Evaluation (IOT&E)	4	2024	4	2024
TFDS Full Rate Production (FRP)	4	2023	4	2023
Load Handling System (LHS) - Compatible Water Tankrack System (HIPPO)	3	2020	4	2025
HIPPO Contract Award	2	2020	2	2020
HIPPO Developmental Test (DT)	4	2020	1	2021
HIPPO Production Award	3	2021	3	2021
HIPPO Production Qualification Testing (PQT)	1	2022	3	2022
HIPPO Full Rate Production (FRP)	4	2022	4	2022
Bulk Fuel Distribution System (BFDS)	1	2020	2	2028
BFDS Materiel Development Decision (MDD)	1	2021	1	2021
BFDS Other Transaction Authority (OTA) Award	4	2020	4	2020
BFDS Developmental Testing (DT)	1	2021	2	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

Events	Start		End	
	Quarter	Year	Quarter	Year
BFDS Milestone C	1	2022	1	2022
BFDS Production Qualification Testing (PQT)	2	2022	2	2023
BFDS Initial Operational Test & Evaluation	3	2022	3	2022
BFDS Full Rate Production (FRP)	4	2022	4	2022
3K Tactical Water Purification System (3K TWPS) RFP Develop	3	2024	4	2025
Water Storage Distribution System (WSDS)	4	2019	4	2023
WSDS Materiel Development Decision (MDD)	2	2020	2	2020
WSDS Milestone C	1	2021	1	2021
WSDS Contract Award	2	2021	2	2021
WSDS Production Qualification Testing (PQT)	3	2021	4	2022
WSDS Full Rate Production (FRP)	3	2022	3	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev				Project (Number/Name) L43 / ENGINEER SUPPORT EQUIPMENT - ED			
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
L43: ENGINEER SUPPORT EQUIPMENT - ED	-	0.341	1.242	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.583
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

These systems provide state-of-the-art deployable, combat engineer and construction equipment and critical life support along with engineer safety and special unit support equipment supporting the joint warfighter. These programs enhance combat and military operations minimize transportation requirements and reduce the logistical footprint by eliminating obsolete equipment and reducing the number of programs. The Combat Engineer and Construction equipment consists of the Surveying, Firefighting Individual Requirements Equipment Support (FIRES), Fire Protection Equipment Type I, II and III, Tactical Fire Fighting Truck Tools (TFFT), Family of Power Utility Kits (FoPUK), and Soldier Portable Kits, Lineman's Tool Kit, Concrete and Masonry, Electricians, Plumbers, Pipefitters, Family of Light Sets (FoLS), Airfield Damage Repair Kit (ADRK), Diving Equipment, Surface Swimmer Support Sets, Surface Supplied Diving Set, procurement of new Technical/Special Tools, Pioneer Support Set, and the Pioneer Land Clearing and Building Erection Set. Project will explore Additive Manufacturing for Engineer systems. Funding will support the procurement of market samples and testing for Soldier Portable Sets, Kits, and Outfits (SKO), Special Tools initiative, and critical life support equipment such as the Deep Sea Set, Underwater Construction Set, Photo Support Set, Diver Supplemental Issue Set, Closed Circuit Scuba Set, Supervisor Propulsion Emergency and Recovery SCUBA (SPEaRS), Divers' Supplemental Issue Set(DSIS), Vertical Skills Engineer Construction Kit (VSECK), and Family of Boats and Motors (FOBAM).

BUDGET ITEM JUSTIFICATION: This project supports development, demonstration, testing and evaluation within the Combat Engineer and Construction Support Equipment arena. These items include critical life support equipment such as diving, firefighting, fire suppression, urban and dense urban operations, subterranean operations, breathable air compressors, and emergency and recovery sets along with engineer safety and special unit support equipment and photo support sets. Funding shall allow for development of dual use systems that support wartime use by Soldiers to include Special Forces and peacetime operations that include national disaster relief and homeland security operations. Much of this equipment has an inherent short Economic Useful Life (EUL). Investments used to revise, update and obtain equipment within this portfolio has resulted in increased readiness, safety, and effectiveness and reductions in footprint.

Funding supports modernization of the current Ordnance/Engineer equipment by investigating technology insertions due to but not limited to obsolescence and technology innovations. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Family of Power Utility Kits (FoPUK)	0.072	0.499	-	-	-
Description: Conduct Market Research, Develop, and Initiate procurement activities for Family of Power Utility Kits (FoPUK).					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>FY 2020 Plans: TM Development, Validation, Log Demo, Verification, Engineer/QA/PM Support</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Zero funding for FY 2021. Transitioning into Production.</p>					
<p>Title: Supervisory Propulsion, Emergency and Recovery Set (SPEaRS)</p> <p>Description: Prepare documentation, conduct market research, procure production representative, and complete required testing.</p> <p>FY 2020 Plans: TM Development, Engineer/QA/PM Support</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Zero funding in FY 2021. RDTE effort complete.</p>	0.125	0.454	-	-	-
<p>Title: Engineering and Quality Assurance</p> <p>Description: Engineering and Quality Assurance of engineering SKOs</p>	0.100	-	-	-	-
<p>Title: Program Management Support</p> <p>Description: Program support costs associated with emerging program development.</p> <p>FY 2020 Plans: Salary support in the product office for emerging programs.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Zero funding in FY 2021. RDTE effort complete.</p>	0.044	0.232	-	-	-
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	-	0.057	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding transferred in accordance with Title 15 USC 7638					
Accomplishments/Planned Programs Subtotals	0.341	1.242	-	-	-

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
• R70001: <i>Family Of Engr Combat and Construction Sets</i>	13.010	11.451	23.324	-	23.324	30.404	-	-	-	0.000	78.189
• R12001: <i>Family of Boats and Motors</i>	8.006	5.745	5.289	-	5.289	-	-	-	-	0.000	19.040
• ML5301: <i>Items Less Than \$5M (Eng Spt)</i>	2.000	4.128	8.014	-	8.014	8.987	-	-	-	0.000	23.129

Remarks

D. Acquisition Strategy

Programs will progress from pre Milestone Decision Document (MDD) activities through market research, market samples, Description for Purchase, development, production representative systems and testing. Modernization and Optimization of existing tools and testing of market samples will progress from Engineering and Manufacturing Development (EMD) and transition into production. All efforts will support the two level maintenance concept utilizing commercial technologies and incorporating them into SKOs to support next generation weapon and support systems.

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				L43 / ENGINEER SUPPORT EQUIPMENT - ED							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	MIPR	PM SKOT : MI	0.408	0.100	Dec 2018	0.065	Dec 2019	-		-		-	Continuing	Continuing	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.057		-		-		-	0.000	0.057	-
Subtotal			0.408	0.100		0.122		-		-		-	Continuing	Continuing	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
Conduct Market Research for Family of Power Utility Kits (FoPUK)	MIPR	TBD : TBD	1.840	-		0.124	Oct 2019	-		-		-	Continuing	Continuing	-
Market Samples for Supervisory, Propulsion, Emergency and Recovery Set (SPEARS)	MIPR	TBD : TBD	0.263	-		-		-		-		-	Continuing	Continuing	-
Conduct Market Research for Urban Search and Rescue	MIPR	TBD : TBD	0.893	-		-		-		-		-	0.000	0.893	-
Airfield Damage Repair Kit (ADRK)	TBD	TBD : TBD	0.055	-		-		-		-		-	0.000	0.055	-
Special Tools hardware	TBD	TBD : TBD	0.100	-		-		-		-		-	0.000	0.100	-
Subtotal			3.151	-		0.124		-		-		-	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
Engineering and Quality Assurance - FoPUK	MIPR	ECBC/ARDEC : Rock Island, IL	0.590	0.072	Oct 2018	0.326	Oct 2019	-		-		-	Continuing	Continuing	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering and Quality Assurance (ES&SUS)	MIPR	ECBC/ARDEC : Rock Island, IL	0.110	-		-		-		-		-	Continuing	Continuing	-
Engineer and Quality Assurance Support - SPEARS	MIPR	ECBC/ARDEC : Rock Island, IL	0.167	0.125	Oct 2018	0.413	Oct 2019	-		-		-	Continuing	Continuing	-
Engineering and Quality Assurance - US&R	MIPR	ECBC/ARDEC : Rock Island, IL	0.300	-		-		-		-		-	Continuing	Continuing	-
General Engineer Support for Engineer Portfolio SKOs	MIPR	ECBC : Rock Island, IL	0.080	-		0.090	Oct 2019	-		-		-	Continuing	Continuing	-
Packaging Support for Engineer Portfolio SKOs	MIPR	ECBC : Rock Island, IL	0.080	0.044	Oct 2018	0.167	Oct 2019	-		-		-	Continuing	Continuing	-
Technical Manual Support	MIPR	TACOM Publications : Warren, MI	0.140	-		-		-		-		-	Continuing	Continuing	-
Engineer and Quality Assurance Airfield Damage Repair Kit (ADRK)	MIPR	ECBC/ARDEC : Rock Island, IL	0.095	-		-		-		-		-	Continuing	Continuing	-
Subtotal			1.562	0.241		0.996		-		-		-	Continuing	Continuing	N/A

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			
Family of Power Utility Kits Testing	MIPR	ATEC : Aberdeen	0.300	-		-		-		-		-	0.000	0.300	-
SPEARS testing	MIPR	ATEC : Aberdeen	0.350	-		-		-		-		-	0.000	0.350	-
Subtotal			0.650	-		-		-		-		-	0.000	0.650	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army							Date: February 2020				
Appropriation/Budget Activity 2040 / 5			R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>				
	Prior Years	FY 2019	FY 2020		FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals	5.771	0.341	1.242		-	-	-	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</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
Market research, develop, build, test Family of Power Utility Kit																												
Market research, develop, build, test SPEARS																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Market research, develop, build, test Family of Power Utility Kit	1	2017	4	2020
Market research, develop, build, test SPEARS	1	2019	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) L46 / <i>Maintenance Support Equipment</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
L46: <i>Maintenance Support Equipment</i>	-	1.365	5.000	1.349	-	1.349	0.839	0.000	0.000	0.000	0.000	8.553
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Mobile Maintenance Equipment provides state of the art, deployable, vehicle-mounted, Soldier portable and containerized shelter tool systems supporting the readiness of the Joint warfighter directly supporting Soldier Lethality, Next Generation Combat Vehicle (NGCV) and Long Range Precision Fires (LRPF), as well as, addressing GAPs 10 and 17. These systems are equipped with industrial quality tools required for Two Level Maintenance that reduce common tool redundancy, provide tool standardization, minimize transportation requirements, reduce logistical footprint, and are backed by a Lifetime Warranty/Replacement Program which reduces sustainment costs. This is accomplished by employing a system of systems approach to maintenance acquisition. The System of Systems approach builds a maintenance capability upon each system, allowing a logical and natural approach to the Army's overall two level maintenance strategy. These inter-connected systems distributed throughout the Army at multiple levels and echelons provide a holistic repair capability in all scenarios and environments. These systems provide the Maintenance and Combat Commanders an unprecedented capability to repair wheeled, tracked, aviation, ground support and weapons systems on site at one location at one time. This approach to maintenance acquisition increases efficiencies and supports the current force while providing modular configurations designed to meet the specific needs of the Army maintainer in today's complex transforming environment.

BUDGET ITEM JUSTIFICATION: The need to develop and maintain a System of System maintenance approach is critical for maintaining readiness due to the growing complexity of today's military equipment, operational tempo, modularity, and current and evolving Tactics Techniques and Procedures (TTPs). The individual maintenance systems are comprehensive, interconnected and capable of solving and repairing any maintenance problems. The System of Systems approach does not advocate specific tools, methods or practices; instead it seeks to promote a streamlined comprehensive set of systems for solving maintenance challenges where the interactions of doctrine, technology, time and tactics techniques and procedures are the primary drivers. Funding for projects shall include test article procurement and testing of Soldier portable maintenance Sets, Kits, and Outfits (SKOs), load banks and refrigeration tool kit; investigation of new technologies for next generation mobile maintenance equipment shop sets including the Shop Equipment Welding (SEW) and Shop Equipment Contact Maintenance (SECM); development of additional Standard Automotive Tool Set (SATS) maintenance modules, Armament Repair Shop Set (ARSS), Mobile Ammunition Processing Facility (MAPF), Forward Repair System (FRS), Special Tools initiatives, shelter mounted system development; packaging development; and technical support for emerging Joint Capabilities Integration and Development System (JCIDS) materiel requirements documents. Additive Manufacturing increased capabilities to the Metal Working and Machining Shop Set (MWMSS) to include a polymer and metal printing and associated digital library capability. Modernization upgrades increase effectiveness while improving efficiency, reliability and maintainability while supporting emerging Army systems as well as using lower cost set components.

Funding supports modernization of the current Ordnance equipment by investigating technology insertions due to but not limited to obsolescence and technology innovations. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement concepts.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L46 / <i>Maintenance Support Equipment</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Next Generation Shop Equipment, Welding (SEW) Description: Develop and Test new components of Shop Equipment, Welding	0.293	-	-	-	-
Title: Armament Repair Shop Set (ARSS) Description: ARSS Shelter Modernization	0.577	-	-	-	-
Title: MWMSS Additive Manufacturing Description: Develop Additive Manufacturing capability for Army systems, Limited User Experiment and Evaluation. FY 2021 Base Plans: Expeditionary Metal Additive Manufacturing options. FY 2020 to FY 2021 Increase/Decrease Statement: Zero funding in FY 2020. Restart RDTE effort in FY 2021 when funding is restored.	0.300	-	1.349	-	1.349
Accomplishments/Planned Programs Subtotals	1.170	-	1.349	-	1.349

	FY 2019	FY 2020
Congressional Add: Next Generation High Mobility Multipurpose Wheeled Vehicle (HMMWV) Shop Equipment Contact Maintenance (SECM) FY 2019 Accomplishments: Next Generation High Mobility Multipurpose Wheeled Vehicle (HMMWV) Shop Equipment Contact Maintenance (SECM) FY 2020 Plans: Next Generation High Mobility Multipurpose Wheeled Vehicle (HMMWV) Shop Equipment Contact Maintenance (SECM)	0.195	5.000
Congressional Adds Subtotals	0.195	5.000

C. Other Program Funding Summary (\$ in Millions)	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
• ML5345: <i>Items Less Than \$5.0M (Maint Eq)</i>	5.253	5.608	5.386	0.184	5.570	7.248	2.323	-	-	0.000	26.002

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L46 / <i>Maintenance Support Equipment</i>

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• G05301: <i>Mobile Maintenance Equipment Systems</i>	34.479	140.053	40.337	7.769	48.106	43.965	-	-	-	0.000	266.603

Remarks

D. Acquisition Strategy

Programs will progress from pre Milestone Decision Document (MDD) activities through market research, market samples, Description for Purchase, development, production representative systems and testing. Modernization and Optimization of existing tools and testing of market samples will progress from Engineering and Manufacturing Development (EMD) and transition into production. All efforts will support the two level maintenance concept utilizing commercial technologies and incorporating them into SKOs to support next generation weapon and support systems.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L46 / <i>Maintenance Support Equipment</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management	MIPR	PM SKOT : Warren, MI	0.312	-		0.500	Mar 2020	0.095	Oct 2020	-		0.095	Continuing	Continuing	-
Subtotal			0.312	-		0.500		0.095		-		0.095	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Armament Repair Shop Set 2 design and development	MIPR	Tobyhanna Army Depot/TBD : Tobyhanna, PA	0.186	0.278	Mar 2019	-		-		-		-	0.000	0.464	-
Develop Rapid Deployment Sets, Kits, & Outfits - Special Tool Initiative.	MIPR	CCDC : Rock Island, IL	0.300	-		-		-		-		-	0.000	0.300	-
Refrigeration Tool Kit (RTK) Logistics Demonstration	MIPR	CCDC : Rock Island, IL	0.394	-		-		-		-		-	0.000	0.394	-
Modernization/Redesign efforts of Truck/Trailer transported shelters for next generation systems	MIPR	CCDC : Rock Island, IL	2.025	-		-		-		-		-	0.000	2.025	-
Procure Ground Based Special Tools in support of Tactical Vehicles	MIPR	PM SKOT : Harrison, MI	0.343	-		-		-		-		-	0.000	0.343	-
Next Generation Shop Equipment Welding (SEW) concept design and development	MIPR	CCDC : Rock Island, IL	2.493	-		-		-		-		-	0.000	2.493	-
Additive Manufacturing Hardware	Various	TBD : TBD	-	-		-		0.543	Dec 2020	-		0.543	0.000	0.543	-
Product Dev Next Generation Shop	MIPR	CCDC : Rock Island, IL	-	-		1.550	Mar 2020	-		-		-	0.000	1.550	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L46 / <i>Maintenance Support Equipment</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Equipment Contact Maintenance															
Subtotal			5.741	0.278		1.550		0.543		-		0.543	0.000	8.112	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineer and Quality Assurance in support of SKOs	MIPR	CCDC : (IL, MI)	1.563	-		-		-		-		-	Continuing	Continuing	-
Packaging Support	MIPR	CCDC Armament Center : Rock Island, IL	0.231	-		-		0.183		-		0.183	Continuing	Continuing	-
Next Generation Shop Equipment Welding (SEW) support	MIPR	ECBC / ARDEC / PM SKOT : (IL, MI)	0.250	0.293	Dec 2018	-		-		-		-	0.000	0.543	-
Refrigeration Tool Kit (RTK) support	MIPR	ECBC / ARDEC / PM SKOT : (IL, MI)	0.153	-		-		-		-		-	0.000	0.153	-
Armament Repair Shop Set 2 support	MIPR	ECBC / ARDEC / PM SKOT : (IL, MI)	0.101	0.231	Dec 2018	-		-		-		-	0.000	0.332	-
Additive Manufacturing support	MIPR	ECBC : IL	-	0.300	Dec 2018	-		0.528	Oct 2020	-		0.528	Continuing	Continuing	-
Fire Suppression Refill System (FSRS) support	MIPR	PM SKOT : MI	0.040	-		-		-		-		-	0.000	0.040	-
Next Generation Shop Equipment Contact Maintenance support	MIPR	ECBC/PM SKOT : (IL, MI)	-	0.195	Dec 2018	1.350	Mar 2020	-		-		-	0.000	1.545	-
Special Tools support	MIPR	ECBC : IL	0.015	-		-		-		-		-	0.000	0.015	-
Next Generation Shop Equipment Contact Maintenance logistic efforts	TBD	Various : Various	-	-		1.000	Jun 2020	-		-		-	0.000	1.000	-

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				L46 / Maintenance Support Equipment							
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
Subtotal			2.353	1.019		2.350		0.711		-		0.711	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
ARSS 2 Testing	MIPR	ATEC : Aberdeen Test Center	0.250	0.068	Dec 2018	-		-		-		-	0.000	0.318	-
Testing of the Next Generation Shop, Equipment Welding	MIPR	ATEC : Aberdeen Test Center	0.315	-		-		-		-		-	0.000	0.315	-
Fire Suppression Refill System (FSRS) testing	MIPR	ATEC : Aberdeen Test Center	0.287	-		-		-		-		-	0.000	0.287	-
Next Generation Shop Equipment Contact Maintenance test	MIPR	ATEC : Aberdeen Test Center	-	-		0.600	Jan 2021	-		-		-	0.000	0.600	-
Subtotal			0.852	0.068		0.600		-		-		-	0.000	1.520	N/A
Project Cost Totals			9.258	1.365		5.000		1.349		-		1.349	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L46 / <i>Maintenance Support Equipment</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
Develop, Procure, and Test Special Tools for Tactical and Comb	█				█																							
Develop, Procure, and Test Refrigeration Tool Kit	█				█																							
Develop, Procure, and Test Armament Repair Shop Set 2 (ARSS	█				█																							
Develop, Procure, and Test Next Generation Shop, Equipment V	█				█																							
Develop, Procure, and Test Additive Manufacturing	█				█				█				█															
Develop, Procure, and Test Next Generation Shop Equipment C	█				█				█																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L46 / <i>Maintenance Support Equipment</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Develop, Procure, and Test Special Tools for Tactical and Combat Vehicles	1	2016	4	2019
Develop, Procure, and Test Refrigeration Tool Kit	1	2017	4	2019
Develop, Procure, and Test Armament Repair Shop Set 2 (ARSS)	1	2018	2	2020
Develop, Procure, and Test Next Generation Shop, Equipment Welding (SEW)	4	2016	3	2020
Develop, Procure, and Test Additive Manufacturing	3	2016	4	2023
Develop, Procure, and Test Next Generation Shop Equipment Contact Maintenance	1	2019	4	2021
Develop, Procure, and Test Fire Suppression Refill System	1	2016	4	2018

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev					Project (Number/Name) L47 / Improved Environmental Control Units Ed		
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
L47: Improved Environmental Control Units Ed	-	2.262	1.076	1.102	-	1.102	1.972	1.494	1.189	1.199	0.000	10.294
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This line supports the Army Network Modernization Strategy Line of Effort #4, Command Post. Program develops/integrates IECUs supporting current and new requirements such as the Command Post Integrated Infrastructure (CPI2), a family of Army Standard Family of Rigid Wall Shelters (ASF-RWS), and other emerging requirements. In addition, supports critical Chemical Biological Radiological and Nuclear (CBRN) modifications required to support the Chemically Protected Deployable Medical System (CP DEPMEDS).

The Improved Environmental Control Units (IECU) program will provide updates that support the new generation of Environmental Control Units (ECUs) that use environmentally approved refrigerants, with zero Ozone-Depleting Chemicals (ODCs) and low Global Warming potential refrigerants to replace the current Military Standard (MIL-STD) Family of ECUs. The IECUs will provide improved cooling, heating and dehumidification to Soldiers and critical equipment systems in combat, combat support, combat service support units, and combat support hospitals. The IECUs are required to replace currently fielded ECUs in order to comply with statutory and regulatory restrictions on the use of Class II ODCs (such as HCFC-22) and to improve the performance of military ECUs. They are form, fit, and function replacements to the current MIL-STD ECUs. Technical improvements over existing ECUs will yield significant fuel and weight savings, reduction in scheduled maintenance and increased reliability. The new family of IECUs utilizes a new refrigerant which complies with mandated Environmental Protection Agency (EPA) requirements. Funding supports the development of application specific variants, shelter system integration, as well as supporting the new ECU requirements coming from the Command Post Integrated Infrastructure (CPI2) and Army Standard Family of Rigid Wall Shelters (ASF-RWS) Capabilities Development Documents (CDD). In addition, the field has identified an emerging requirement for cooling at intermediate capacities. These variants will further standardize cooling units in the field, enable cooling of larger shelters and structures, offer increased mobility, and may be used to cool multiple tents with one unit. Funding also supports developing initial prototypes to enable refinement of operational requirement and early user feedback to support future sustainment and operational energy concepts.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Technology Development	1.370	0.388	0.277	-	0.277
Description: Concept development for the family of Improved Environmental Control Units (IECUs), integrated shelter systems, variants, and integrated heating/cooling system applications.					
FY 2020 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L47 / <i>Improved Environmental Control Units Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Conduct Physical Configuration Audit (PCA) to finalize 60K IECU Technical Data Package (TDP) to support follow-on production contract</p> <p>FY 2021 Base Plans: Conduct testing of 60K IECU CB variant and complete final design documentation.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funds moved to support Testing accomplishments.</p>					
<p>Title: Government System Test and Evaluation</p> <p>Description: Testing of prototype performance for multiple variants of the IECUs and soft wall shelter ECUs.</p> <p>FY 2020 Plans: Complete development testing of 60K IECU Block II prototypes to evaluate capabilities and performance.</p> <p>FY 2021 Base Plans: Complete testing at Aberdeen Test Center (ATC) or similar facility to evaluate capabilities and performance of 60K IECU CB Variant.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funds moved from Technology Development to support Testing accomplishments.</p>	0.050	0.188	0.250	-	0.250
<p>Title: Other Contract and Government Agency</p> <p>Description: Support engineering, logistics, and testing efforts for multiple ECU variants, and integrated heating/cooling units. Match and right-size current IECU family to applications and/or develop and test new variants to provide the most efficient system solution.</p> <p>FY 2020 Plans: Complete build of 60K IECUs using baseline TDP, conduct limited performance testing and PCA. Concept development for IECU integration with RWS in support of CPI2 and ASF-RWS.</p> <p>FY 2021 Base Plans: Complete validation of baseline TDP for 60K IECU CB variant, conduct limited performance testing and PCA. Concept development for IECU integration in support of CPI2 and Army Standard Family of Rigid Wall Shelters.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	0.712	0.264	0.275	-	0.275

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L47 / <i>Improved Environmental Control Units Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funds moved to support Testing accomplishments.					
Title: Government Program Management Description: Provide oversight and management of engineering, logistics, contracts, and testing efforts for the IECU family and multiple user engagements in preparation for IECU variants to transition to production. Provide oversight and management of follow-on ECU variants. FY 2020 Plans: Provide oversight and management of engineering, logistics, contracts, and testing efforts for next generation IECU system development efforts. FY 2021 Base Plans: Continue to provide oversight and management of engineering, logistics, contracts, and testing efforts for next generation IECU system development efforts including 60K IECU CB 2 and 9/18/36K IECU programs. FY 2020 to FY 2021 Increase/Decrease Statement: Funds increased to support testing efforts.	0.130	0.187	0.300	-	0.300
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638	-	0.049	-	-	-
Accomplishments/Planned Programs Subtotals	2.262	1.076	1.102	-	1.102

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>
• MF9303: IMPROVED ENVIRONMENTAL CONTROL UNITS	10.122	7.344	8.200	0.370	8.570	8.339	8.086	8.164	8.096	Continuing	Continuing

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L47 / <i>Improved Environmental Control Units Ed</i>

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

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

D. Acquisition Strategy

Support modernization and technology insertions required to adapt ECUs future integrated system heating and cooling requirements in support of Force 2025 and the Command Post Integrated Infrastructure (CPI2) and chemically protected deployable medical system. Evaluate requirements versus existing ECU Fleet and develop/test initial prototypes of ECUs in support of future integrated system heating and cooling requirements. This effort will support the development of Purchase Descriptions (PDs) and Technical Data Packages (TDPs) for eventual competitive procurement.

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				L47 / Improved Environmental Control Units Ed							
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
9,18 and 36K Improved Environmental Control Unit (IECU)	Various	PM E2S2 : various	1.334	0.094		-		0.150		-		0.150	0.000	1.578	Continuing
Trailer Variants	Various	PM E2S2 : various	0.633	-		-		-		-		-	0.000	0.633	Continuing
60K IECU	Various	PM E2S2 : various	0.301	0.036		0.186		0.150		-		0.150	0.000	0.673	-
Integrated heating/cooling units	Various	PM E2S2 : various	0.105	-		-		-		-		-	0.000	0.105	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.049		-		-		-	0.000	0.049	-
Subtotal			2.373	0.130		0.235		0.300		-		0.300	0.000	3.038	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
9, 18 and 36K Improved Environmental Control Unit (IECU)	MIPR	CERDEC Night Vision Lab : Ft Belvoir, VA	2.064	-		0.129		0.150		-		0.150	0.000	2.343	Continuing
Trailer Mounted variants	MIPR	CERDEC Night Vision Lab : Ft Belvoir, VA	0.736	-		-		-		-		-	0.000	0.736	-
60K IECU	MIPR	ARDEC PIF : Huntsville. AL	2.662	1.370		0.425		0.127		-		0.127	0.000	4.584	-
Integrated heating/cooling units	MIPR	CERDEC Night Vision Lab : Ft. Belvoir, VA	0.325	-		-		-		-		-	0.000	0.325	-
Subtotal			5.787	1.370		0.554		0.277		-		0.277	0.000	7.988	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) L47 / Improved Environmental Control Units Ed
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
9, 18 and 36K Improved Environmental Control Unit (IECU)	MIPR	CERDEC : Fort Belvoir, VA	2.117	0.712		-		-		-		-	0.000	2.829	-
60K IECU	Various	CERDEC : Fort Belvoir, VA	4.407	-		-		0.275		-		0.275	0.000	4.682	-
Trailer variants	MIPR	CERDEC : Fort Belvoir, VA	1.242	-		-		-		-		-	0.000	1.242	-
Integrated heating/cooling units	MIPR	CERDEC : Fort Belvoir, VA	0.321	-		-		-		-		-	0.000	0.321	-
Subtotal			8.087	0.712		-		0.275		-		0.275	0.000	9.074	N/A

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			
9,18 and 36K Improved Environmental Control Unit (IECU)	MIPR	A TEC : APG, MD	0.478	0.050		-		-		-		-	0.000	0.528	-
Trailer Variants	MIPR	A TEC : APG, MD	0.424	-		-		-		-		-	0.000	0.424	Continuing
60K IECU	MIPR	A TEC : APG, MD	0.625	-		0.287		0.250		-		0.250	0.000	1.162	-
Integrated heating/cooling units	MIPR	A TEC : APG, MD	0.200	-		-		-		-		-	0.000	0.200	-
Subtotal			1.727	0.050		0.287		0.250		-		0.250	0.000	2.314	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		
Project Cost Totals		17.974	2.262	1.076	1.102	-	1.102	0.000	22.414	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L47 / <i>Improved Environmental Control Units Ed</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				
Concept development for IECU integration with RWS in support	[Blue bar]																															
60K IECU TDP Conversion Effort	[Blue bar]																															
Test Modified 60K IECU																																
Design and Testing for potential product improvements to IECU Family (BLOCK II)																																
Concept Development for Intermediate IECU																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L47 / <i>Improved Environmental Control Units Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Concept development for IECU integration with RWS in support of CPI2 and ASF-RWS	1	2018	4	2024
60K IECU TDP Conversion Effort	4	2018	4	2019
Test Modified 60K IECU	4	2020	3	2021
Design and Testing for potential product improvements to IECU Family (BLOCK II)	1	2022	4	2024
Concept Development for Intermediate IECU	1	2023	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev				Project (Number/Name) VR7 / Combat Service Support Systems			
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
VR7: <i>Combat Service Support Systems</i>	-	4.837	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.837
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

VR7 efforts completed in FY 2019.

A. Mission Description and Budget Item Justification

This project supports Engineering and Manufacturing Development (EMD) of critical soldier support and sustainment systems that provide more endurance and agility to combat operations enabling success of Army Expeditionary Forces in future multi-domain scenarios. Project includes highly mobile shelter systems (rigid and soft wall), expeditionary base camp subsystems, field service systems, mortuary affairs equipment, field heaters, and other combat service support equipment. These systems will fill identified theater capability gaps, improve safety, improve unit sustainability, improve resource and energy efficiency and increase combat effectiveness. This project supports Engineering and Manufacturing Development (EMD), Prototyping, and testing of critical tactical support systems that support mobile Joint Service command and control, medical, force projection and maintenance platforms. This project develops critical enablers that support the Army Campaign Plan and Army Modernization Strategy by maintaining readiness through fielding and integrating new equipment. This project also ensures Army Expeditionary Forces are capable of rapid deployment while reducing sustainment requirements, related Combat Support/Combat Service Support (CS/CSS) demands in lift, combat zone footprint, and costs for logistical support.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Expeditionary Shelter Protection System (ESPS) Description: ESPS is a lightweight, rapidly deployable and reusable ballistic protection system that can be integrated with commonly used military shelters in expeditionary and remote base camps and outposts where more robust forms of ballistic protection (i.e. sandbags, concrete barriers) are not readily available or logistically feasible.	0.450	-	-	-	-
Title: Laundry and Shower Improvements (LADS) Description: Provides an enhanced capability for field hygiene with improved hot and cold weather performance, better compatibility with current and future combat clothing, and increased reliability, maintainability and ease of operation.	1.295	-	-	-	-
Title: Containerized Ice Making System (CIMS)	0.327	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) VR7 / <i>Combat Service Support Systems</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: Develops an add-on ice making capability that automatically dispenses and seals 10 pound bags at a rate of a minimum of 3,600 pounds of ice per day. This capability is based upon current Army operational requirements for ice which is four pounds per Soldier per day. This capability enables support for up to 900 personnel. Current operations require external support to provide personnel with ice for cooling drinking water in extremely arid environments. This capability will reduce the sustainment risk and cost associated with transporting this commodity from external sources. The objective requirement enables stockage of ice to assist with surge operations.					
Title: Army Standard Family of Rigid Wall Shelters (ASF-RWS) Description: The ASF-RWS program will conduct formal development to incorporate the latest technologies into a fully supportable and modernized family. The intent is to eliminate the proliferation of non-standard shelters and their associated logistics burden, thereby reducing the lifecycle cost of RWS across the Services. The program will produce approved Technical Data Packages (TDPs) to support procurements by materiel developers and Program Managers (PMs) requiring RWS. Once developed and formally type-classified, ASF-RWS procurements are customer funded by PMs as a cost under their program(s). The ASF-RWS will consist of three variants: (1) Expandable/Non-Expandable; (2) Vehicle Mounted; and (3) Panelized/Collapsible with a focus on the following features and improvements: reduced cost, reduced weight, improved energy efficiency, improved corrosion resistance, and improved transportability.	2.765	-	-	-	-
Accomplishments/Planned Programs Subtotals	4.837	-	-	-	-

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
• VR8: <i>Combat Service Support Systems - Ad</i>	3.115	-	0.000	-	0.000	-	-	-	-	0.000	3.115

Remarks

D. Acquisition Strategy
The acquisition strategy is to accelerate product development and testing to transition into production.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) VR7 / Combat Service Support Systems
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Project Management Support	Various	PM Force Sustainment Systems : Natick, MA	1.999	0.610	Nov 2018	-		-		-		-	0.000	2.609	-
CBI Support	Various	PD CBI : Warren, MI	3.747	-		-		-		-		-	0.000	3.747	-
Subtotal			5.746	0.610		-		-		-		-	0.000	6.356	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Soldier Support Equipment	TBD	Various : Various	10.788	0.175	Nov 2018	-		-		-		-	0.000	10.963	-
Contingency Basing Infrastructure	Various	Various : Various	1.531	-		-		-		-		-	0.000	1.531	-
Laundry Improvements	Various	Various : Various	-	0.500	Nov 2018	-		-		-		-	0.000	0.500	-
Army Standard Family of Rigid Wall Shelters (ASF-RWS)	Various	Various : Various	-	2.000	Dec 2018	-		-		-		-	0.000	2.000	-
Subtotal			12.319	2.675		-		-		-		-	0.000	14.994	N/A

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			
Soldier Support Equipment	Various	Various : Various	8.342	0.275	Dec 2018	-		-		-		-	0.000	8.617	-
Contingency Basing Infrastructure	Various	Various : Various	1.206	-		-		-		-		-	0.000	1.206	-
Laundry Improvements	Various	Various : Various	-	0.695	Dec 2018	-		-		-		-	0.000	0.695	-
Army Standard Family of Rigid Wall Shelters (ASF-RWS)	Various	Various : Various	-	0.582	Mar 2019	-		-		-		-	0.000	0.582	-
Subtotal			9.548	1.552		-		-		-		-	0.000	11.100	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) VR7 / <i>Combat Service Support Systems</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, evaluate, and transition modernized equipment into F	█																											
Conduct DT on ESPS		█	█																									
Prepare for and execute Type Classification of ESPS		█	█	█																								
Obtain TC-STD for ESPS						▲																						
Develop Laundry System Improvements	█	█																										
Conduct DT/OT on Laundry System Improvements			█	█																								
Prepare for Type Classification of CIMS			█	█																								
Award OTA Element 2 and procure/build prototypes for ASF-RWS (Exp/Non-Exp)					█	█																						
Conduct DT/OT on ASF-RWS (Exp/Non-Exp) variants							█	█																				
Prepare for and obtain Milestone C / TC-STD decision for ASF-RWS (Exp/Non-Exp)											█	█																
Obtain Milestone C TC-STD decision for ASF-RWS Expandable/Non-Expandable Variant																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) VR7 / <i>Combat Service Support Systems</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Integrate, evaluate, and transition modernized equipment into FP & Command Posts	1	2016	4	2019
Conduct DT on ESPS	1	2019	3	2019
Prepare for and execute Type Classification of ESPS	1	2019	2	2020
Obtain TC-STD for ESPS	2	2020	2	2020
Develop Laundry System Improvements	2	2017	2	2019
Conduct DT/OT on Laundry System Improvements	3	2019	4	2019
Prepare for Type Classification of CIMS	3	2019	4	2019
Award OTA Element 2 and procure/build prototypes for ASF-RWS (Exp/Non-Exp)	4	2019	2	2020
Conduct DT/OT on ASF-RWS (Exp/Non-Exp) variants	2	2020	3	2020
Prepare for and obtain Milestone C / TC-STD decision for ASF-RWS (Exp/Non-Exp)	3	2020	4	2020
Obtain Milestone C TC-STD decision for ASF-RWS Expandable/Non-Expandable Variant	4	2020	4	2020

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng 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	-	15.366	12.595	11.079	-	11.079	20.370	20.204	17.631	17.026	0.000	114.271
593: <i>Joint Battle Command - Platform (JBC-P)</i>	-	15.366	12.595	11.079	-	11.079	20.370	20.204	17.631	17.026	0.000	114.271

A. Mission Description and Budget Item Justification

This funding line is directly aligned to the Army Network Modernization Strategy LOE 2, Common Operating Environment. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

JBC-P supports the LOE 2 by utilizing:

- Interoperable data, message, and waveforms
- Integration with Joint C5ISR and strike capabilities
- Sensors and applications that enable operations across domains

The Joint Battle Command - Platform program is the cornerstone of Joint Forces Command and Control (C2) Situational Awareness (SA) and communications. JBC-P includes a network which enables the movement of data and provides secure Blue Force Tracking (BFT) capability in Platforms and Command Posts, providing soldiers and commanders a map-based Common Operating Picture of the battlefield, as a result, reducing fratricide.

PdM JBC-P, under PM Mission Command (MC), is collaborating with the Command, Control, Communications, Computers, Combat Systems, Intelligence, Surveillance, and Reconnaissance (C5ISR) Space and Terrestrial Communications Directorate (S&TCD) on evolving the BFT network. Systems engineering/planning activities are underway to develop the evolution path of the BFT network, and the introduction of a Modular Open Systems Approach (MOSA). In addition, there were two RDT&E contractual efforts in FY18 (assess the feasibility of reusing existing BFT-2 transceivers (hardware) and replacing it third party or government owned waveforms), and FY 2019 (assess the feasibility of introducing BFT network resiliency components to existing BFT network). Those efforts are intended to inform a BFT-3 full and open solicitation (RFP) to industry in FY 2021.

JBC-P RDT&E resources are used to improve JBC-P hardware, network performance, and network resiliency; while Mounted Computer Environment (MCE) RDT&E is used to improve and add software applications.

FY 2021 funding has been increased to allow JBC-P to perform initial modular waveform audit and validation, prototype BFT-3 transceiver performance testing, and release of transceiver contract solicitation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	15.950	12.595	8.622	-	8.622
Current President's Budget	15.366	12.595	11.079	-	11.079
Total Adjustments	-0.584	0.000	2.457	-	2.457
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.584	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	2.457	-	2.457

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>				Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</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
593: <i>Joint Battle Command - Platform (JBC-P)</i>	-	15.366	12.595	11.079	-	11.079	20.370	20.204	17.631	17.026	0.000	114.271
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line is directly aligned to the Army Network Modernization Strategy LOE 2, Common Operating Environment. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

JBC-P supports the LOE 2 by utilizing:

- Interoperable data, message, and waveforms
- Integration with Joint C5ISR and strike capabilities
- Sensors and applications that enable operations across domains

The Joint Battle Command - Platform program is the cornerstone of Joint Forces Command and Control (C2) Situational Awareness (SA) and communications. JBC-P includes a network that enables the movement of data and provides secure Blue Force Tracking (BFT) capability in Platforms and Command Posts. This network provides soldiers and commanders a map-based Common Operating Picture of the battlefield, and as a result, reduces fratricide.

PdM JBC-P, under PM Mission Command (MC), is collaborating with the Command, Control, Communications, Computers, Combat Systems, Intelligence, Surveillance, and Reconnaissance (C5ISR) Space and Terrestrial Communications Directorate (S&TCD) on evolving the BFT network. Systems engineering/planning activities are underway to develop the evolution path of the BFT network, and the introduction of a Modular Open Systems Approach (MOSA). In support of BFT evolution, there were two RDT&E contractual efforts in FY 2018 (assess the feasibility of reusing existing BFT-2 transceivers (hardware) and replacing it third party or government owned waveforms), and FY 2019 (assess the feasibility of introducing BFT network resiliency components to existing BFT network). Those efforts are intended to inform a BFT-3 full and open solicitation (RFP) to industry in FY 2021.

FY 2021 JBC-P RDT&E resources are used to improve JBC-P hardware, network performance, and network resiliency; while Mounted Computer Environment (MCE) RDT&E is used to improve and add software applications.

FY 2021 funding has been increased to allow JBC-P to perform initial modular waveform audit and validation, prototype BFT-3 transceiver performance testing, and release of transceiver contract solicitation.

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

	FY 2019	FY 2020	FY 2021
Title: Software/Systems Engineering	13.533	10.363	8.753

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>	Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Description: Perform Software/Systems Engineering in support of the development of JBC-P capabilities, applications, and services, to include, but not limited to, conducting engineering studies, architecture development (both software and network), system analyses, technical readiness assessments, technical interchange meetings/events, and development of related reports and other deliverables.</p> <p>FY 2020 Plans: Continue to conduct Systems Engineering, and Component Characterization and Validation for next generation BFT transceiver; to include the development of the BFT 3 transceiver modular waveform, interoperability with the BFT 2 Satellite Network Control Center (SNCC) and Satellite Ground Station (SGS), and upgrade the Waveform/Network Virtualization for the BFT network to support the new modular waveform.</p> <p>Funding will also support development of solicitation package for BFT 3 next generation Transceiver full and open competition, and Modular Open Systems Approach (MOSA) development.</p> <p>FY 2021 Plans: Continue to conduct Systems Engineering, and prototype design for next generation BFT transceiver; to include the development and integration of the BFT 3 transceiver running the BFT modular waveform, interoperability with the BFT 2 Satellite Network Control Center (SNCC) and Satellite Ground Station (SGS), and upgrade the Waveform/Network Virtualization for the BFT network to support the new modular waveform. Funding will also support the BFT 3 next generation Transceiver development award.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Software/Systems Engineering funding decreases from FY 2020 to FY 2021 to focus on prototype BFT-3 transceiver performance testing and perform initial modular waveform audit and validation. This coincides with the Test, Evaluation and Integration funding increase from FY 2020 to FY 2021.</p>				
<p>Title: Test, Evaluation and Integration</p> <p>Description: Plan and conduct system Integration test and experimentation events, in support of the JBC-P family of systems, to include Risk Reduction Events, vulnerability testing, and Army Interoperability Certification (AIC) testing.</p> <p>FY 2020 Plans: FY 2020 testing will continue evaluating enhancements to the BFT/JBC-P network, to include third-party component (transceiver) characterization, validation of the BFT 3 satellite ground station components, and validation of the RIF ?Resilient BFT?</p>		0.757	0.757	1.251

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>	Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>deliverable. JBC-P will continue to develop lab-based operational risk reductions of the currently fielded BFT 1 and BFT 2 network, to include the SNCC, SGS, and Waveform Virtualization.</p> <p>FY 2021 Plans: Will conduct testing enhancements to the BFT/JBC-P network, to include third party component (transceiver) characterization, BFT modular waveform verification and validation, and validation of the Rapid Innovation Funding (RIF) deliverables.</p> <p>Continue to maintain and upgrade BFT network mitigation test lab (operational risk reduction of the currently fielded BFT 1 and BFT 2 network, to include the Satellite Network Control Center (SNCC), Satellite Ground Station (SGS)), and the updated modular waveform virtualization.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Test, Evaluation and Integration funding increased from FY 2020 to FY 2021 because of increased C5ISR lab based internal waveform testing to further inform BFT-3 transceiver award.</p>				
<p>Title: PM Support (Matrix & Contractor)</p> <p>Description: JBC-P matrix and contractor support, including technical, logistics, and business staff oversight.</p> <p>FY 2020 Plans: Will continue to provide technical (SATCOM, Network, Intel, RF, Cyber, Waveform, Transport) and business oversight for JBC-P architecture sustainment and system engineering activities. Program Management includes funds execution, contract management, and logistical support for the BFT-3 integrated planning team (IPT) & consortium (industry & academia).</p> <p>FY 2021 Plans: Will continue to provide technical (SATCOM, Network, Intel, RF, Cyber, Waveform, Transport) and business oversight for JBC-P architecture sustainment and system engineering activities. Program Management includes funds execution, contract management, and logistical support for the BFT-3 standards body (responsible for configuration management, and new technology insertion into the modular open systems architecture and the modular waveform).</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: PM Support (Matrix & Contractor) funding remains relatively constant from FY 2020 to FY2021.</p>		1.076	0.903	1.075
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans:</p>		-	0.572	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>	Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Funding transferred in accordance with Title 15 USC ?638			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	15.366	12.595	11.079

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
• W61990: JOINT BATTLE COMMAND - PLATFORM (JBC-P)	401.991	282.114	243.850	-	243.850	170.832	160.402	145.606	176.484	0.000	1,581.279

Remarks
Procurement funding in FY 2016 through 2025 (Base funding) is designated for the procurement, fielding, and program management of JBC-P Family of Systems including JBC-P and JBC-P Log.

D. Acquisition Strategy
The JBC-P Capabilities Development Document in lieu of Capabilities Production Document (CDD ILO CPD) was Joint Requirements Oversight Council (JROC) approved March 2013. Completed Initial Operational Test & Evaluation (IOT&E) as part of Network Integration Evaluation (NIE) 13.2 in 3QFY13. The IOT&E tested the JBC-P system software on existing FBCB2 hardware (non-dismountable vehicle systems) and future production-representative hardware. On completion of Army Interoperability Certification (AIC) and Joint Interoperability Test Certification (JITC), MDA authorized Full Rate Production (FRP) in 1QFY14. First unit equipped (FUE) was successfully conducted 3QFY15.

Developmental efforts are being performed through intra-government collaboration. System engineering efforts are being performed by C5ISR's Space and Terrestrial Communications Directorate (S&TCD); Command, Power and Integration (CP&I) and the Intelligence and Information Warfare Directorate (I2WD). Those efforts are intended to inform a BFT-3 full and open solicitation (RFP) to industry FY21. Hardware along with fielding, training and field support efforts are obtained through existing competitively awarded 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 / 5				PE 0604805A / Command, Control, Communications Systems - Eng Dev				593 / Joint Battle Command - Platform (JBC-P)							
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	-	-		0.572		-		-		-	0.000	0.572	-
Subtotal			-	-		0.572		-		-		-	0.000	0.572	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
JBC-P Software Development	Various	Multiple : Multiple	67.463	-		-		-		-		-	Continuing	Continuing	-
JBC-P Software/System Engineering	Various	Multiple (Government and industry) : Multiple	45.397	13.533	Jan 2019	10.363	Jan 2020	8.753	Dec 2020	-		8.753	Continuing	Continuing	-
Subtotal			112.860	13.533		10.363		8.753		-		8.753	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
PM Support (Matrix / SETA Contractor)	Various	PM JBC-P : Aberdeen Proving Ground (APG), MD	8.254	1.076	Dec 2018	0.903	Dec 2019	1.251	Dec 2020	-		1.251	Continuing	Continuing	-
Subtotal			8.254	1.076		0.903		1.251		-		1.251	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
Develop and Conduct Tests and Assessments	MIPR	Multiple : Multiple	28.901	0.757	Jan 2019	0.757	Jan 2020	1.075	Dec 2020	-		1.075	Continuing	Continuing	-
Subtotal			28.901	0.757		0.757		1.075		-		1.075	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / Command, Control, Communications Systems - Eng Dev	Project (Number/Name) 593 / Joint Battle Command - Platform (JBC-P)

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
AIC JBC-P v1.6.0.7	[Redacted] Software version 1.6.0.7																											
Army Expeditionary Warfighter Experiment (AEWE)	[Redacted] AEWE 19																											
BFT 3 Systems Engineering Development and Consurtium	[Redacted] CCDC/C5ISR Led With Industry Partners																											
RIF Unit Experimentation					[Redacted] FY20 - Developmental Operations (DevOps)																							
NetModX (Unit Experimentation)					[Redacted] DevOps Test Event																							
BFT 3 Transceiver Developmental Testing (C5ISR Lab based)									[Redacted] FY21 Internal waveform testing to further inform 4Q FY21 BFT-3 Transceiver award																			
BFT 3 Transceiver Request for Proposal (RFP)									1 [Redacted] BFT 3 RFP																			
BFT 3 Transceiver Contract Award													2 [Redacted] BFT 3 Transceiver Contract Award															
BFT 3 Transceiver Design Review 1													3 [Redacted] Unofficial Preliminary Design Review (PDR)															
BFT 3 Transceiver Developmental Testing (C5ISR Lab based) 2													[Redacted] FY22 BFT-3 Transceiver C5ISR Lab Based Testing															
BFT 3 Transceiver Design Review 2													4 [Redacted] Unofficial Critical Design Review (CDR)															
BFT 3 Transceiver Developmental Test (DT)																	[Redacted] Planned Transceiver DT											
BFT 3 Transceiver Delivery (Engineering and Manufacturing Design (EMD)) Phase																	5 [Redacted] Initial Transceiver Delivery (EMD) Phase											

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>	Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</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
BFT 3 Transceiver Operational Test (OT)																					<div style="background-color: #0000ff; width: 100%; height: 15px; margin-bottom: 5px;"></div> Planned Transceiver OT							
BFT 3 Transceiver Delivery (Limited Rate Initial Production (LRIP))																					<div style="text-align: center;">6</div> BFT 3 Transceiver Delivery (LRIP)							
BFT 3 Transceiver Full Rate Production (FRP) Contract Award																					<div style="text-align: center;">7</div> FRP Award							
BFT 3 Transceiver First Unit Equipped (FUE)																					<div style="text-align: center;">8</div> Transceiver FUE							

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>	Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
AIC JBC-P v1.6.0.7	4	2018	2	2019
Army Expeditionary Warfighter Experiment (AEWE)	2	2019	3	2019
BFT 3 Systems Engineering Development and Consurtium	2	2017	4	2021
RIF Unit Experimentation	3	2020	4	2020
NetModX (Unit Experimentation)	3	2020	3	2020
BFT 3 Transceiver Developmental Testing (C5ISR Lab based)	1	2021	4	2021
BFT 3 Transceiver Request for Proposal (RFP)	1	2021	1	2021
BFT 3 Transceiver Contract Award	4	2021	4	2021
BFT 3 Transceiver Design Review 1	1	2022	1	2022
BFT 3 Transceiver Developmental Testing (C5ISR Lab based) 2	1	2022	4	2022
BFT 3 Transceiver Design Review 2	3	2022	3	2022
BFT 3 Transceiver Developmental Test (DT)	1	2023	2	2023
BFT 3 Transceiver Delivery (Engineering and Manufacturing Design (EMD)) Phase	1	2023	1	2023
BFT 3 Transceiver Operational Test (OT)	1	2024	2	2024
BFT 3 Transceiver Delivery (Limited Rate Initial Production (LRIP))	1	2024	1	2024
BFT 3 Transceiver Full Rate Production (FRP) Contract Award	2	2024	2	2024
BFT 3 Transceiver First Unit Equipped (FUE)	2	2025	2	2025

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng 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	-	45.054	48.264	49.870	-	49.870	46.860	49.173	46.166	47.070	0.000	332.457
812: <i>Mil HIV Vac&Drug Dev</i>	-	1.140	1.201	1.229	-	1.229	1.066	6.063	6.259	6.259	0.000	23.217
832: <i>Field Medical Systems Engineering Development</i>	-	33.175	31.218	32.282	-	32.282	31.621	29.896	29.774	30.447	0.000	218.413
849: <i>Infec Dis Drug/Vacc Ed</i>	-	10.739	15.845	16.359	-	16.359	14.173	13.214	10.133	10.364	0.000	90.827

A. Mission Description and Budget Item Justification

This Program Element (PE) funds advanced development of medical materiel within the System Demonstration and Low Rate Initial Production portions of the acquisition life cycle using 6.5 (System Development and Demonstration) funding. It supports products successfully developed in the Systems Integration portion of the Systems Development and Demonstration phases through completion of the Milestone C Decision Review. Commercially-off-the-shelf (COTS) medical products are also tested and evaluated for military use, when available. This PE primarily includes pivotal (conclusive) human clinical trials necessary for licensure by the Food and Drug Administration (FDA).

Projects in this PE include the following:

Project 812 funds military relevant human immunodeficiency virus (HIV) medical countermeasures. These funds provide for engineering and manufacturing development of candidate vaccines and drugs to permit large-scale field testing. Development focused on military unique needs effecting manning, mobilization, and deployment. Products from this project will normally transition to Department of Defense (DoD) Health Programs or Other Procurement, Army (OPA) Funds.

Project 832 funds the engineering and manufacturing development of medical products for enhanced combat casualty care and follow-on care, including rehabilitation. Mature COTS medical products are also evaluated for military use. Consideration will also be given to reduce the medical sustainment footprint through smaller weight and cube volume, or equipment independence from supporting materiel. Products from this project will normally transition to OPA Funds.

Project 849 funds development of candidate medical countermeasures for military relevant infectious diseases. These products fall in four major areas: vaccines, drugs, diagnostic kits/devices, and insect control measures to limit exposure and disease transmission. FDA approval is a mandatory obligation for all military products placed into the hands of medical providers or service members for human use. Products from this project will normally transition to DoD Health Programs or OPA funds.

These Projects are managed by United States (U.S.) Army Medical Materiel Development Activity (USAMMDA) and U.S. Army Medical Materiel Agency (USAMMA) of the U.S. Army Medical Research and Materiel Command.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	44.495	48.264	49.365	-	49.365
Current President's Budget	45.054	48.264	49.870	-	49.870
Total Adjustments	0.559	0.000	0.505	-	0.505
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.559	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.505	-	0.505

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 812 / <i>Mil HIV Vac&Drug 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
812: <i>Mil HIV Vac&Drug Dev</i>	-	1.140	1.201	1.229	-	1.229	1.066	6.063	6.259	6.259	0.000	23.217
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds militarily relevant human immunodeficiency virus (HIV) medical countermeasures. These funds provide for engineering and manufacturing development of candidate vaccines and drugs to permit large-scale field testing. Development is focused on militarily unique needs effecting manning, mobilization, and deployment.

The major contractor is The Henry M. Jackson Foundation for the Advancement of Military Medicine, Rockville, MD. Research efforts are coordinated with the National Institutes of Health.

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

	FY 2019	FY 2020	FY 2021
<p>Title: Military HIV Vaccine and Drug Development</p> <p>Description: This effort provides funds for engineering and manufacturing development of candidate vaccines and drugs to permit large-scale field testing of vaccines for medical countermeasures to HIV.</p> <p>FY 2020 Plans: Continue support to Global Vaccine Candidate clinical trial sites based on a Cooperative Research and Development Agreement (CRADA) with a commercial partner.</p> <p>FY 2021 Plans: Continue support to Global Vaccine Candidate clinical trial sites based on a Cooperative Research and Development Agreement (CRADA) with a commercial partner.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The minor increase of funding in FY 2021 was due to the inflation factor.</p>	1.140	1.146	1.229
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	-	0.055	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 812 / <i>Mil HIV Vac&Drug Dev</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	1.140	1.201	1.229

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

N/A

Remarks

D. Acquisition Strategy

To support testing and evaluation of commercially developed vaccine candidates in government-managed trials.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev	Project (Number/Name) 812 / Mil HIV Vac&Drug Dev
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development Management Services Cost	Various	Various : Various	2.833	0.396		1.146		1.229		-		1.229	Continuing	Continuing	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.055		-		-		-	0.000	0.055	-
Subtotal			2.833	0.396		1.201		1.229		-		1.229	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development Cost	Various	Henry M. Jackson Foundation, : Various	33.967	-		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			33.967	-		-		-		-		-	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development Support Cost	Various	Various : Various	2.413	-		-		-		-		-	Continuing	Continuing	-
Regulatory Support	Option/ Various	Clinical Research Management, Inc : Various	0.835	0.065		-		-		-		-	0.000	0.900	-
Subtotal			3.248	0.065		-		-		-		-	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 812 / <i>Mil HIV Vac&Drug Dev</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				
Global HIV (Ad26/Ad26+gp140) Biologic License Application (BLA) Submission/MS C																									■							
Global HIV (Ad26/Ad26+gp140) BLA Approval																									■							
Global HIV (Ad26/Ad26+gp140) Post FDA Approval Marketing Studies																									■							
Global HIV (Ad26/Ad26+gp140) Fielding																									■							

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 812 / <i>Mil HIV Vac&Drug Dev</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Global HIV (Ad26/Ad26+gp140) Biologic License Application (BLA) Submission/MS C	1	2024	1	2024
Global HIV (Ad26/Ad26+gp140) BLA Approval	4	2024	4	2024
Global HIV (Ad26/Ad26+gp140) Post FDA Approval Marketing Studies	1	2025	4	2028
Global HIV (Ad26/Ad26+gp140) Fielding	1	2026	4	2029

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev				Project (Number/Name) 832 / Field Medical Systems Engineering Development			
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
832: Field Medical Systems Engineering Development	-	33.175	31.218	32.282	-	32.282	31.621	29.896	29.774	30.447	0.000	218.413
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds the engineering and manufacturing development of medical products for enhanced combat casualty care and follow-on care, including rehabilitation. Mature COTS medical products are also evaluated for military use. Specifically funds pivotal (conclusive) human clinical trials or mechanical engineering evaluations for effectiveness of devices or biologics (products derived from living organisms) to fulfill unique military requirements. Consideration is also given to reducing the medical sustainment footprint through smaller weight and cube volume, or equipment independence from supporting materiel. This work is frequently completed through a laboratory/contractor team with the contractor obtaining the U.S. Food and Drug Administration (FDA) licensure for sale of the product.

Major contractors/intra-governmental agencies include: IGR Enterprises, Inc.; Army Medical Department Board Test Center; Se Qual Technologies, Inc.; Enginivity, Inc.; Ultrasound Diagnostician; HemCon Medical Technologies; Cerdak Ltd; Hemerus Medical, LLC; Fast Track Drugs & Biologics, LLC; Integrated Medical Systems, Inc.; the National Institutes of Health National Heart, Lung and Blood Institute (NHLBI); and the U.S. Army Aeromedical Research Laboratory, Walter Reed Army Institute of Research (WRAIR) and Institute of Surgical Research (ISR) for user evaluation. Other military agencies include Program Executive Office (PEO) Soldier, PEO Combat Support/Combat Service Support (CS & CSS), and Naval Undersea Warfare Center.

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

	FY 2019	FY 2020	FY 2021
<p>Title: Field Medical Systems Engineering Development PM Warfighter Expeditionary Medicine and Treatment (formerly PM Medical Devices)</p> <p>Description: This effort funds the engineering and manufacturing development of medical products for enhanced combat casualty care.</p> <p>FY 2020 Plans: Medical Equipment Sets COTS Modernization of Life Cycle Equipment: Will continue development and testing on a reduced number/fewer types of devices (compared to FY19) to ensure the most current and cost effective devices are being utilized. Equipment will be selected for modernization based on life cycle plan as part of a Sets, Kits and Outfits (SKO).</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased due to PMO reorganization.</p>	2.946	1.788	-
<p>Title: Field Medical Systems Engineering Development PM Warfighter Deployed Medical Systems</p> <p>Description: Funding is provided for development of blood products enhanced combat casualty care and follow-on care.</p>	-	-	1.676

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 832 / <i>Field Medical Systems Engineering Development</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>FY 2021 Plans: Medical Equipment Sets COTS Modernization of Life Cycle Equipment: Will continue development and testing to ensure the most current and cost effective devices are being utilized. Equipment will be selected for modernization based on its own life cycle plan as part of a Sets, Kits and Outfits.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding increased due to PMO reorganization.</p>				
<p>Title: Field Medical Systems Engineering Development PM Warfighter Protection and Acute Care (formerly PM Pharmaceuticals)</p> <p>Description: Funding is provided for engineering and manufacturing development of medical products for enhanced combat casualty care and follow-on care, including blood products.</p> <p>FY 2020 Plans: Cryopreserved Platelets: Continuing the new acquisition strategy that was developed and implemented in FY 2018 where a single commercial partner is utilized for the manufacturing development, clinical trials and regulatory processes thru licensure. Continue non-clinical in-Vitro characterization and Phase 2 Clinical Trial efficacy study.</p> <p>Freeze-Dried Plasma Program: Will complete the Phase 2 safety and effectiveness study and prepare for of Phase 3 (expanded safety, effectiveness and dosing) pivotal study.</p> <p>FY 2021 Plans: Cryopreserved Platelets: Will continue the new acquisition strategy that was developed and implemented in FY 2018 where a single commercial partner is utilized for the manufacturing development, clinical trials and regulatory processes thru licensure. Will continue non-clinical in-Vitro characterization and Phase 2 Clinical Trial efficacy study.</p> <p>Freeze-Dried Plasma Program: Will complete the Phase 2 safety and effectiveness study and prepare for of Phase 3 (expanded safety, effectiveness and dosing) pivotal study.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The increase of funding in FY 2021 is due to the planned progression of medical products under development.</p>		11.962	7.905	14.702
<p>Title: Field Medical Systems Engineering Development PM Warfighter Health, Performance and Evacuation (formerly PM Medical Support Systems)</p> <p>Description: This project funds the engineering and manufacturing development of medical products for prevention of injury, enhanced combat casualty care, and evacuation.</p>		5.430	4.247	5.019

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 832 / <i>Field Medical Systems Engineering Development</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p><i>FY 2020 Plans:</i> Modernization of medical equipment sets: Will continue to evaluate the Field Hospital waste water collection system, blood transport products, and other commercial items for medical equipment sets.</p> <p>Airworthiness Testing: Conduct airworthiness testing, required by AR 70-62, for Medical Equipment Set and Mission Essential Package with products covering air and ground medical evacuation.</p> <p>Medical Evac and Treatment Vehicles Medical Equipment Set and Mission Essential Package and CASEVAC: Collaborate with Program Executive Office Combat Support/Combat Service Support for implementation of the CASEVAC system for the Joint Light Tactical Vehicle (JLTV).</p> <p>Waste Treatment System for the CSH: Project was not initiated as planned in FY 2018.</p> <p>Soldier Optimization Decision Aids (SODA): Will transition the Cold Weather Ensemble Decision Aid and the Heat Strain Decision Aid to Program Executive Office Soldier. Will continue to refine the Environment Health Assessment and Risk Management (eHARM) tool for transition.</p> <p>Remote Triage Sensor System: Project was not initiated as planned in FY 2018.</p> <p>Semi-autonomous Casualty Evacuation (CASEVAC) Ground Platform (S-MET): Will collaborate with Program Executive Office Combat Support/Combat Service Support for implementation of the CASEVAC system for the S-MET platform.</p> <p>Next Generation Uniform Repellent/Impregnation: Will conduct operational assessment and integration into PEO Soldier uniform procurement.</p> <p>Litter Transport Shock/Stressor Mitigation System (Formerly: Next Generation Immobilization System): Will assess system for augmentation and inclusion in medical unit assemblages containing litters.</p> <p><i>FY 2021 Plans:</i> Modernization of medical equipment sets: Will complete modernization and evaluation of the Field Hospital water distribution and waste water management system and blood transport products. Will continue evaluation of other commercial items for medical equipment sets.</p>				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 832 / <i>Field Medical Systems Engineering Development</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Airworthiness Testing: Will conduct airworthiness testing, required by AR 70-62, for Medical Equipment Set and Mission Essential Package with products covering air evacuation.</p> <p>Medical Evac and Treatment Vehicles Medical Equipment Set and Mission Essential Package and CASEVAC: Will complete design and evaluation of the CASEVAC system for the JLTV</p> <p>Soldier Optimization Decision Aids (SODA): Will coordinate with PEO Soldier to transition the Mental Acuity, Environmental Exposure Electronic (E3) form (formerly Environment Health Assessment and Risk Management (EHARM) tool) and the Cold Weather Ensemble Decision Aid.</p> <p>Next Generation Uniform Repellent/Impregnation: Will complete project and transition to PEO Soldier.</p> <p>Litter Transport Shock/Stressor Mitigation System (Formerly: Next Generation Immobilization System): Project concluded in FY 2018 with transition to the Air Force.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The increase of funding in FY 2021 is due to projected requirements of the program.</p>				
<p>Title: Field Medical Systems Engineering Development - PM Warfighter Brain Health (formerly PM Neurotrauma & Psychological Health)</p> <p>Description: This effort funds systems engineering development of medical products for enhanced combat casualty care for diagnosis of Traumatic Brain Injury (TBI).</p> <p>FY 2020 Plans: Laboratory Assay for Traumatic Brain Injury (TBI) - Point of Care (formerly TBI Diagnostic Assay System): Will conduct required validation studies for testing of a blood assay on the Point of Care Device to aid in the diagnosis of TBI. Will prepare for a submission of the assay for Food and Drug Administration Approval. Will start analysis of data to validate how the assay predicts recovery from TBI.</p> <p>FY 2021 Plans: Laboratory Assay for TBI - Point of Care (formerly TBI Diagnostic Assay System): Will continue validation studies for testing of a blood assay to aid in the diagnosis of TBI. Will finalize FDA submission of the assay for Food and Drug Administration approval. Will finalize data analysis and report on the assay's ability to predict recovery from TBI.</p>		12.837	16.031	10.885

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 832 / <i>Field Medical Systems Engineering Development</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Non-invasive neuro assessment device (NINAD): Moved to WBH due to PMO Reorganization. Will initiate developmental testing and initial operational assessments based on FDA approval and maturity of other commercially available products. FY 2020 to FY 2021 Increase/Decrease Statement: Funding decrease from FY 2020 to FY 2021 due to less funding required for product in FY 2021.				
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638		-	1.247	-
Accomplishments/Planned Programs Subtotals		33.175	31.218	32.282
C. Other Program Funding Summary (\$ in Millions) N/A				
Remarks				
D. Acquisition Strategy To support developing in-house or industrial prototypes in government-managed programs to meet military and regulatory requirements for production and fielding.				

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev	Project (Number/Name) 832 / Field Medical Systems Engineering Development
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development Management Services Cost	Various	Various : Various	37.734	7.511		5.314		6.336		-		6.336	Continuing	Continuing	Continuing
Medical Product Development Management Services Cost	PO	General Dynamics Information Technology : Frederick MD	-	-		-		0.300		-		0.300	0.000	0.300	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.247		-		-		-	0.000	1.247	-
Subtotal			37.734	7.511		6.561		6.636		-		6.636	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Hypertonic Saline Dextran	Various	National Institutes of Health, National Heart, Lung and Blood Institute (NHLBI) : Various	15.100	-		-		-		-		-	Continuing	Continuing	Continuing
Medical Product Development Cost	Various	Various : Various	8.576	2.352		-		-		-		-	Continuing	Continuing	Continuing
Extended Life Red Blood Cell Product	Various	Hemerus Medical, LLC, : Various	3.140	-		-		-		-		-	Continuing	Continuing	Continuing
Cryopreserved Platelets	Various	Clinical Research Management, Inc : Hinckley, OH	6.890	2.523		-		-		-		-	Continuing	Continuing	Continuing
Cryopreserved Platelets	Various	TBD : TBD	1.875	-		2.474		4.250		-		4.250	0.000	8.599	-
Intracellular Hemorrhage Treatment	TBD	TBD : TBD	0.600	-		-		-		-		-	0.000	0.600	-
TBI Diagnostic Assay System - Increment II (benchtop/POC)	Various	Banyan BioMarkers, Inc : Alachua, FL	0.373	-		-		-		-		-	0.000	0.373	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev				Project (Number/Name) 832 / Field Medical Systems Engineering Development							
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
Noninvasive Neurodiagnostics	TBD	TBD : TBD	2.647	-		-		-		-		-	0.000	2.647	-
Impedance Threshold Device for the Treatment of Traumatic Brain Injury	TBD	Advance Circulatory Systems Inc. : Roseville, MN	4.387	-		-		-		-		-	0.000	4.387	-
Pre-Hospital Medical Informatics Transport (Ground Transport Telemedicine)	TBD	TBD : TBD	6.321	-		-		-		-		-	0.000	6.321	-
Advanced wound care	Various	TBD : TBD	1.230	-		-		-		-		-	0.000	1.230	-
Junction Noncompressible Hemorrhage	TBD	RevMedX Inc : Wilsonville OR	1.805	-		-		-		-		-	0.000	1.805	-
Laboratory Assay for Traumatic Brain Injury	C/Various	Abbott Laboratories : Chicago, IL	2.810	10.401		15.996		7.660		-		7.660	Continuing	Continuing	Continuing
Freeze Dried Plasma	TBD	TBD : TBD	-	1.437		-		-		-		-	0.000	1.437	-
Subtotal			55.754	16.713		18.470		11.910		-		11.910	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
Regulatory Support	Various	Clinical Research Management, Inc., : Various	8.350	0.410		0.074		-		-		-	Continuing	Continuing	Continuing
Medical Product Development Support Cost	Various	Various : Various	11.729	-		-		0.730		-		0.730	Continuing	Continuing	Continuing
Medical Equipment Sets Development	Various	Various : Various	2.670	-		-		1.457		-		1.457	0.000	4.127	-
Subtotal			22.749	0.410		0.074		2.187		-		2.187	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 832 / <i>Field Medical Systems Engineering 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
Transport Telemedicine Systems (TTS)- MEDHUB Platform	[Redacted]				[Redacted]																							
	MEDHUB Platform																											
Transport Telemedicine Systems (TTS)- MEDHUB Drug Safety & Tracking	[Redacted]																											
	MEDHUB Drug Safety and Tracking																											
Extremity Injury Repair - Vascular- Pivotal Study									[Redacted]																			
									Vascular- Pivotal Study																			
Extremity Injury Repair - Vascular- Environmental Testing/Operational Testing													[Redacted]															
													Vascular- Environmental Testing/Operational Testing															
Extracorporeal Life Support- Developmental Contract					[Redacted]																							
					Developmental Contract																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 832 / <i>Field Medical Systems Engineering Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Cryopreserved Platelets (CPP) Phase 2 efficacy clinical studies	3	2017	4	2020
Cryopreserved Platelets (CPP) Phase III clinical studies	4	2020	3	2023
Cryopreserved Platelets (CPP) Milestone C	4	2023	4	2023
Freeze-dried Plasma (FDP) Phase I safety clinical studies	3	2014	2	2018
FDP Phase 2 efficacy clinical studies	2	2016	2	2019
FDP MS-B	3	2016	3	2016
FDP MS-C	4	2020	4	2020
Noninvasive Neuroassessment Device Development	1	2018	1	2025
Laboratory Assay for TBI Increment !! Point of Care Device Clinical Trial	1	2020	4	2022
Laboratory Assay for TBI Point of Care Device MS C Inc 1	4	2020	4	2020
Laboratory Assay for TBI Point of Care Device MS C Inc 2	4	2022	4	2022
Temporary Corneal Repair	4	2016	1	2023
Extracorporeal Life Support	4	2016	4	2024
Temporary Corneal Repair -Prototype Testing	2	2018	1	2020
Temporary Corneal Repair- Clinical Study	1	2021	3	2022
Transport Telemedicine Systems (TTS)- MEDHUB Platform	3	2013	3	2020
Transport Telemedicine Systems (TTS)- MEDHUB Drug Safety and Tracking	4	2017	3	2024
Extremity Injury Repair - Vascular- Pivotal Study	1	2018	1	2022
Extremity Injury Repair - Vascular- Environmental Testing/Operational Testing	1	2021	1	2023
Extracorporeal Life Support- Developmental Contract	4	2019	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>					Project (Number/Name) 849 / <i>Infec Dis Drug/Vacc Ed</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
849: <i>Infec Dis Drug/Vacc Ed</i>	-	10.739	15.845	16.359	-	16.359	14.173	13.214	10.133	10.364	0.000	90.827
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds development of candidate medical countermeasures (MCM: e.g., vaccines, drugs, diagnostic kits/devices) for militarily relevant infectious diseases. This also funds methods to determine if insects are infected with pathogenic organisms thereby posing a risk to service members' and control insect exposure/prevent Warfighters from being bitten by those insects. It funds research that supports conclusive human clinical trials to demonstrate MCM effectiveness safety and related manufacturing tests. This work, which is jointly performed by military laboratories, civilian contracted pharmaceutical firms and foreign research partners, is directed toward the prevention of disease, early diagnosis, and speeding recovery once diagnosed. Medical products approved for human use must meet the U.S. Food and Drug Administration (FDA) approval before MCM can be used on Warfighters. Development priority is based upon four major factors: (1) the extent of the disease within the Combatant Commands' theater of operations, (2) the clinical severity of the disease, (3) the technical maturity of the proposed solution, and (4) the affordability of the solution (development, production, and sustainment). Malaria, dysentery, hepatitis, and Dengue diseases (a severe debilitating disease transmitted by mosquitoes), which are found in all Combatant Command areas and are at the top of the infectious diseases risks list.

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

	FY 2019	FY 2020	FY 2021
Title: Infectious Disease Drug and Vaccine Engineering Development	10.739	15.240	16.359
Description: Funding for research and development efforts for drugs and vaccines for infectious diseases that are top threats to deployed US forces. Funds research that supports conclusive human clinical trials to demonstrate effectiveness, safety and related manufacturing tests.			
FY 2020 Plans:			
Dengue Tetravalent Vaccine (DTV): Will continue to fund support for Advance Development (AD) candidate vaccine as it enters third year of pivotal phase 3 clinical trial.			
Malaria Chemoprophylaxis ?Tafenoquine (formerly Next Generation Malaria Prophylaxis): Will continue the retinal (eye) safety study started in FY 2017. Will address any FDA post-marketing approval requirements.			
Topical Antileishmanial Cream (TLC, Paromomycin/Gentamicin): Will conduct safety and therapeutic dose non clinical testing based on FDA guidance. Antimalarial Drug, Artesunate Intravenous: Will conduct required non-clinical study for FDA review.			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 849 / <i>Infec Dis Drug/Vacc Ed</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Dengue Vaccine Block II: Will continue the development, testing and selection of strains for the dengue human infection model (DHIM) to be used in the early evaluation of dengue vaccine candidates in advance of phase 2 and 3 trials under PE 0603807A, Project 808.</p> <p>Rapid Diagnostic and Detection Devices (Formerly Infectious Disease Diagnostics (Multiple)): The dengue and chikungunya assays will continue to be developed and evaluated. Clinical testing will be conducted for dengue and clinical sites identified for chikungunya.</p> <p>Tick-Bourne Encephalitis Vaccine: Develop Pfizer's European Medicines Agency approved TBEVV for FDA licensure following commercial partner agreement</p> <p>FY 2021 Plans: Dengue Vaccine Effort: Will continue to fund support for Advance Development (AD) candidate vaccine for the expanded FDA safety/effectiveness/dosing study in humans.</p> <p>Malaria Prophylactic Drug ? Tafenoquine (TQ) (Formerly Next Generation Malaria Prophylaxis): Achieved MS C in FY19. Will address any remaining FDA post-marketing approval requirements.</p> <p>Topical Antileishmanial Cream (TLC, Paromomycin/Gentamicin): Project terminated in FY 2019.</p> <p>Rapid Diagnostic and Detection Devices: The dengue and chikungunya assays will continue to be developed and evaluated. Clinical testing for dengue will continue.</p> <p>Tick-Bourne Encephalitis Vaccine (TBEVV): Develop Pfizer's European Medicines Agency approved TBEVV for FDA licensure following commercial partner agreement.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The increase of funding in FY 2021 is due to the planned progression of multiple infectious disease medical products in development. Funding will support the FDA requirements for manufacturing development and clinical trials for those products.</p>				
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans:</p>		-	0.605	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 849 / <i>Infec Dis Drug/Vacc Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Funding transferred in accordance with Title 15 USC ?638			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	10.739	15.845	16.359

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

N/A

Remarks

D. Acquisition Strategy

To support testing and evaluation of in-house and commercially developed products in government-managed trials to meet FDA requirements and Environmental Protection Agency registration.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev	Project (Number/Name) 849 / Infec Dis Drug/Vacc Ed
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development Management Services Cost	Various	Various : Various	21.739	3.620		0.737		0.500		-		0.500	Continuing	Continuing	Continuing
Medical Product Development Management Services Cost	C/CPFF	General Dynamics Information Technology : Frederick MD	10.885	1.586		2.240		1.500		-		1.500	0.000	16.211	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.605		-		-		-	0.000	0.605	-
Subtotal			32.624	5.206		3.582		2.000		-		2.000	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Medical Product Development Cost	Various	Various : Various	38.518	1.039		3.460		-		-		-	Continuing	Continuing	Continuing
Topical Antileishmanial Drug	TBD	TBD : TBD	2.400	-		2.347		-		-		-	0.000	4.747	-
Topical Antileishmanial Drug	C/TBD	Advantar Laboratories, INC : TBD	2.686	-		0.797		-		-		-	0.000	3.483	-
Dengue Tetravalent Vaccine	TBD	TBD : TBD	2.047	-		-		-		-		-	0.000	2.047	-
Rapid Diagnostic and Detection Devices	Various	Inbios, Inc : Seattle WA	-	-		-		3.673		-		3.673	0.000	3.673	-
Hemorrhagic Fever W/ Renal Syndrome	C/TBD	TBD : TBD	1.000	-		-		-		-		-	0.000	1.000	-
Subtotal			46.651	1.039		6.604		3.673		-		3.673	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 / 5				PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev				849 / Infec Dis Drug/Vacc Ed							
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
Medical Product Development Support Cost	Various	Various : Various	19.380	0.012		-		-		-		-	Continuing	Continuing	Continuing
Medical Product Development Support Cost	PO	Clinical Research Management, In : Hinckley, OH	6.383	0.055		0.152		-		-		-	0.000	6.590	-
Subtotal			25.763	0.067		0.152		-		-		-	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
Medical Product Development T&E Cost	Various	Various : Various	51.320	-		-		-		-		-	Continuing	Continuing	Continuing
Dengue Tetravalent Vaccine	TBD	WRAIR/AFRIMS : Silver Spring MD	1.402	0.386		0.433		0.390		-		0.390	0.000	2.611	-
Dengue Tetravalent Vaccine	C/TBD	BioPath : Philippines	5.161	0.813		2.568		0.750		-		0.750	0.000	9.292	-
Product Development of Dengue Tetravalent Vaccine	Various	TBD : TBD	4.530	-		-		-		-		-	0.000	4.530	-
Next Generation Malaria Prophylaxis	Various	DVC : Frederick MD	-	3.228		2.506		2.729		-		2.729	0.000	8.463	-
Tick-Borne Encephalitis Vaccine	Various	TBD : TBD	-	-		-		4.513		-		4.513	0.000	4.513	-
Norovirus Vaccine	Various	TBD : TBD	-	-		-		2.304		-		2.304	0.000	2.304	-
Subtotal			62.413	4.427		5.507		10.686		-		10.686	Continuing	Continuing	N/A
Project Cost Totals			167.451	10.739		15.845		16.359		-		16.359	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev	Project (Number/Name) 849 / Infec Dis Drug/Vacc Ed

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
Dengue Tetravalent Vaccine (DTV) Phase 3 Pivotal Clinical Trials	FY11-FY18																											
DTV Milestone C (MS-C) Engineering, Manufacturing and Development phase review													5 MS-C															
DTV Biologic Licensing Application (BLA) Submission					2 BLA Submission																							
DTV BLA Approval									3 BLA Approval																			
Rapid Human Diagnostic Devices									FY20-FY25																			
Norovirus Vaccine Phase 3 Pivotal Clinical Trials													Norovirus Phase 3 Clinical Trials															
Tick-Borne Encephalitis Vaccine Phase 3 Pivotal Clinical Trials													Tick-Borne Phase 3 Clinical Trials															
Treatment for Resistant Wound Infections Antifungal Drug Phase 2 safety trial																	Phase 2 safety trial											
Malaria Prophylaxis Post FDA Approval Marketing Studies																	Malaria Marketing Studies											
Paromomycin/Gentamicin TLC (MS-C) Engineering, Manufacturing and Development																												
Paromomycin/Gentamicin TLC New Drug Application (NDA)													NDA Submission															
Paromomycin/Gentamicin TLC FDA Approval													4 FDA Approval															
Paromomycin/Gentamicin TLC (Fielding / Delivery)																					Fielding/Delivery							

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 849 / <i>Infec Dis Drug/Vacc Ed</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
Leishmania Rapid Diagnostic Device (Fielding / Delivery)																												
Fielding/Delivery																												
Hemorrhagic Fever with Renal Syndrome Clinical Studies																												
Clinical Studies																												
Dengue Vaccine Block II Adult Indication Studies																												
Adult Indication Studies																												
Dengue Vaccine Block II OCONUS Clinical Trials																												
Clinical Trials																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 849 / <i>Infec Dis Drug/Vacc Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Dengue Tetravalent Vaccine (DTV) Phase 3 Pivotal Clinical Trials	1	2011	2	2020
DTV Phase 2 Adult Traveler / Military Indication Studies	2	2012	1	2017
DTV Milestone C (MS-C) Engineering, Manufacturing and Development phase review	1	2022	1	2022
DTV Biologic Licensing Application (BLA) Submission	2	2020	2	2020
DTV BLA Approval	2	2021	2	2021
Malaria Prophylaxis (MS-C) Engineering, Manufacturing and Development phase	4	2018	4	2018
Rapid Human Diagnostic Devices	1	2021	4	2025
Norovirus Vaccine Phase 3 Pivotal Clinical Trials	3	2021	4	2026
Tick-Borne Encephalitis Vaccine Phase 3 Pivotal Clinical Trials	2	2021	4	2026
Treatment for Resistant Wound Infections Antifungal Drug Phase 2 safety trial	2	2023	4	2026
Malaria Prophylaxis Post FDA Approval Marketing Studies	4	2018	4	2023
Paromomycin/Gentamicin TLC Phase 3 Safety and Effectiveness Clinical Trial	1	2016	1	2017
Paromomycin/Gentamicin TLC (MS-C) Engineering, Manufacturing and Development	4	2019	4	2019
Paromomycin/Gentamicin TLC New Drug Application (NDA)	3	2020	3	2021
Paromomycin/Gentamicin TLC FDA Approval	4	2021	4	2021
Paromomycin/Gentamicin TLC (Fielding / Delivery)	4	2021	4	2024
Leishmania Rapid Diagnostic Device (Fielding / Delivery)	1	2015	4	2020
Hemorrhagic Fever with Renal Syndrome Clinical Studies	1	2016	4	2020
Dengue Vaccine Block II Adult Indication Studies	1	2016	4	2020
Dengue Vaccine Block II OCONUS Clinical Trials	1	2016	4	2020

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng 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	-	39.261	37.108	9.589	-	9.589	9.226	9.088	2.398	1.919	0.000	108.589
016: <i>Close Combat Capabilities ENG DEV</i>	-	7.454	19.198	7.591	-	7.591	3.231	2.094	2.398	1.919	0.000	43.885
415: <i>Mine Neutral/Detection</i>	-	31.807	17.910	1.998	-	1.998	5.995	6.994	0.000	0.000	0.000	64.704

A. Mission Description and Budget Item Justification

This Program Element (PE) provides for the Engineering and Manufacturing Development (EMD) and demonstration of networked munitions, countermine systems, Explosive Ordnance Disposal (EOD) render safe, and counter improvised explosive device capabilities. This PE also implements the National Landmine Policy to develop alternatives to the non-self-destructing counter mobility anti-personnel landmine systems. The PE contributes to area access and area denial (A2/AD) to support unified land operations and improve soldier survivability.

Project 016: Funding in this program supports the Army's Cross Functional Teams (CFT) initiatives. Project 016, Close Combat Capabilities, covers two programs: Next Generation Advanced Bomb Suit (NGABS) and Explosive Ordnance Disposal Render Safe (EOD RS). It provides for the Engineering and Manufacturing Development (EMD) and demonstration of capabilities needed for Explosive Ordnance Disposal (EOD) teams to Render Safe (RS) US and foreign ordnance and improvised explosive devices, enabling ground force commanders to retain freedom of maneuver and secure lines of communications. NGABS directly contributes to Soldier lethality and ground force commander freedom of maneuver by providing next generation sensor and optics in the cutting-edge Heads-Up-Display (HUD) while integrating the Government's latest investments in protective material for the modular, scalable NGABS bomb suit fabrication. EOD RS equips EOD teams with low light visual augmentation system, electronic countermeasures, buried IED detection, dismounted X-ray imager, X-ray generator, trace explosive, Chemical, Biological, Radiological, and Nuclear (CBRN), and drug detection, unmanned aerial system, power management, gamma and neutron search and detection, and render safe initiation. This project will continue to support cross-service initiatives to improve commonality.

NGABS will increase the Warfighter lethality and mobility by optimizing Soldier protection for EOD personnel, while effectively managing all life cycle aspects of Personal Protective Equipment (PPE). Warfighter lethality is increased through bomb suit weight reduction utilizing extensive investments in protective material research and development. The result is material solutions that are lighter and are pieced together in a manner which increases Soldier mobility and longevity. EOD Soldier situational awareness and exposure to ballistic threats is enhanced through the NGABS HUD which allows the Soldier increased visibility under various obscurants and low/no-light situations.

Project 415: This Project provides for Engineering Manufacturing and Development (EMD) for the next generation of capabilities to detect, identify and neutralize hybrid threats and explosive hazards such as Improvised Explosive Devices (IEDs) and landmines. These capabilities are a Family of Systems (FOS) encompassing handheld, vehicle mounted, small robotic mounted, aerial platform mounted and area access, and neutralization systems operating in manned, remotely controlled, semi-autonomous or fully autonomous modes. Continued development of this FOS is necessary to support Route Clearance Platoons located within both Engineer Companies and Brigade Engineering Battalion Brigade Combat Teams.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	
<p>The Husky Mounted Detection System (HMDS) is a counter-explosive device capability that provides standoff detection and marking of metallic encased caches and metallic and low-metallic antitank landmines, unexploded ordnance, trigger mechanisms, and improvised explosive devices (IEDs) in support of route and area-clearance operations. HMDS is a mission equipment package mounted on the Husky route clearance vehicle. The program was restructured in September 2016 to align with emerging shallow buried Wire Detection (WD) capabilities integrated onto the HMDS Increment A1 configuration (includes Ground Penetrating Radar (GPR)). These changes are necessary to adapt to changing IED threats. WD Technology will be fully integrated through Engineering Change Proposals (ECPs) at the end of FY20. Prototypes developed under the concluded HMDS Increment A2 effort may be leveraged in development of future capabilities. Future capabilities may include detection of deep buried IEDs and caches, and semi-autonomous control of the Husky vehicle and HMDS from inside a follow-on vehicle.</p> <p>Route Clearance & Interrogation System (RCIS) Type I consists of a semi-autonomous vehicle and includes designated control vehicles and Operator Control Units (OCUs) which provide a standoff capability to detect and neutralize the full spectrum of explosive hazards. Type I integrates a semi-autonomous kit onto a High Mobility Engineering Excavator (HMEE) for remote control from a Buffalo Mine Protected Clearance Vehicle (MPCV). RCIS Type I semi-autonomous kit will be integrated onto the HMEE and be capable of interrogating and classifying explosive hazards. An OCU will be integrated into a Buffalo MPCV for Type I. RCIS capabilities will be fielded to Route Clearance Squads and Engineer Platoons which includes Tele-operation, RADAR-based Follow-Me, LIDAR obstacle detection, onscreen predictive turning map, and customizable camera views in order to achieve the RCIS mission.</p> <p>Standoff Robotic Explosive Hazard Detection System (SREHD), formerly known as the Autonomous Mine Detection System (AMDS), provides increased survivability through mine and explosive hazards stand-off detection, marking and neutralization capability for the dismounted soldier. It provides area access and freedom of movement for the Commander. SREHD consists of payload modules to be mounted on man-portable unmanned ground vehicles. The payloads are for surface laid and buried threats to include mines and explosive hazards. This capability allows a soldier to remain in a protective posture while detecting and neutralizing a wide variety of hybrid and conventional explosive threats. SREHD conducted a successful Milestone (MS) C in April 2018 and initiated Low Rate Initial Production (LRIP) in June 2018. Due to the realignment of funds FY 2020-2024 to higher Army priorities, the proponent withdrew support to the Standoff Robotic Explosive Hazard Detection System (SREHD) after Low Rate Initial Production (LRIP) award. Research, Development, Test and Evaluation (RDTE) tasks will conclude in FY 2019 under FY 2018 PE 0654808A, Project 415, Landmine Warfare/Barrier - Eng Dev, once corrective action plans and trainer re-development are completed. The program will conclude in June 2020 under FY 2018 OPA R68260 / AREA MINE DETECTION SYSTEM (AMDS) and PAA E50510 / DEMO KIT, BLASTING: Munition Array Charge, XM335 for system qualification and production and receipt of LRIP quantities for an orderly program closeout.</p> <p>Robotic Explosive Hazard Detection System (REHDS) provides the warfighter with a robotic mounted capability to detect and mark buried landmines and IEDs from a safe standoff distance. REHDS is an enabler for Soldier Lethality as it enables soldier maneuverability by enhancing the probability and speed of detection of buried landmines and IEDs allowing for increased speed of dismounted operations making the unit more efficient and lethal. REHDS is a new start in FY 2021 and begins in the Engineering and Manufacturing Development (EMD) phase. REHDS will leverage developed SREHD capability and incorporate increased Rate of Advanced Downtrack (RoAD) and Integration to the Man Transportable Robotic System (MTRS) II platform. FY 2021 Total Base funding in the amount of \$1.998 million supports EMD activities with REHDS.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	43.064	39.208	166.902	-	166.902
Current President's Budget	39.261	37.108	9.589	-	9.589
Total Adjustments	-3.803	-2.100	-157.313	-	-157.313
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-2.100			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-3.803	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-157.313	-	-157.313

Change Summary Explanation

FY 2021 funding decrease in the amount of \$157.313 million due to a change in acquisition strategy for the Close Terrain Shaping Obstacle development effort. Funding has been realigned as appropriate to Program Element 0603619A, Project EK7, Area Denial Capability Development and Budget Line Item 0612E76740, Standard Stock Number (SSN) F78310 - Close Terrain Shaping Obstacles.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev				Project (Number/Name) 016 / Close Combat Capabilities ENG DEV			
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
016: Close Combat Capabilities ENG DEV	-	7.454	19.198	7.591	-	7.591	3.231	2.094	2.398	1.919	0.000	43.885
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 016: Funding in this program supports the Army's Cross Functional Teams (CFT) initiatives. Project 016, Close Combat Capabilities, covers two programs: Next Generation Advanced Bomb Suit (NGABS) and Explosive Ordnance Disposal Render Safe (EOD RS). It provides for the Engineering and Manufacturing Development (EMD) and demonstration of capabilities needed for Explosive Ordnance Disposal (EOD) teams to Render Safe (RS) US and foreign ordnance and improvised explosive devices, enabling ground force commanders to retain freedom of maneuver and secure lines of communications. NGABS directly contributes to Soldier lethality and ground force commander freedom of maneuver by providing next generation sensor and optics in the cutting-edge Heads-Up-Display (HUD) while integrating the Government's latest investments in protective material for the modular, scalable NGABS bomb suit development. EOD RS equips EOD teams with low light visual augmentation system, electronic countermeasures, buried IED detection, dismounted X-ray imager, X-ray generator, trace explosive, Chemical, Biological, Radiological, and Nuclear (CBRN), and drug detection, unmanned aerial system, power management, gamma and neutron search and detection, and render safe initiation. This project will continue to support cross-service initiatives to increase commonality.

NGABS will increase the Warfighter survivability and mobility by optimizing Soldier protection for EOD personnel, while effectively managing all life cycle aspects of Personal Protective Equipment (PPE). Warfighter lethality is increased through bomb suit weight reduction utilizing extensive investments in protective material research and development. The result is material solutions that are lighter and are pieced together in a manner which increases Soldier mobility and longevity. EOD Soldier situational awareness and exposure to ballistic threats is enhanced through the NGABS HUD which allows the Soldier increased visibility under various obscurants and low/no-light situations.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Next Generation Advanced Bomb Suit (NGABS)	7.454	11.230	6.592	-	6.592
Description: The objective of this effort is to increase the Warfighter lethality, modularity, and mobility, by optimizing Soldier protection and situational awareness for EOD personnel. The mission of this program is to enhance the tactical utility and applicability of this bomb suit concept by incorporating modularity/scalability and sensor technologies that are non-existent in legacy designs. This new, tailorable, full body protective system will provide a significantly increased capability at a reduced weight.					
FY 2020 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 016 / <i>Close Combat Capabilities ENG DEV</i>

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>In FY 2020, the NGABS team will continue to evaluate and develop system and subsystem technologies for the NGABS system to assist in the protection from emerging ballistic/blast threats, and sensor technologies.</p> <p>FY 2021 Base Plans: NGABS FY 2021 plans center around finalizing the production design for the bomb suit, executing ballistic and blast test plans with subsequent fixes applied to the suit design. FY 2021 also leads NGABS into the complex phases of component integration; sensor suite, Heads Up Display (HUD), power, cooling, helmet, and suit with Soldier Protection System components. All of these components combined are the NGABS system. FY 2021 includes the planning and scheduling for system level tests (ballistic, blast, environmental, Human Factor Evaluation (HFE), etc.).</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: NGABS funding decrease from FY 2020 to FY 2021 is due to the initial prototyping of sensor and optics subsystems which primarily occur in FY 2020, resulting in a decrease for FY 2021.</p>					
<p>Title: Explosive Ordnance Disposal (EOD) Render Safe (RS)</p> <p>Description: Render Safe (RS) procedures require technicians to employ a wide variety of capabilities and explosives.</p> <p>FY 2020 Plans: Conduct evaluation, integration, and logistics demonstration of the following capabilities: low light visual augmentation, localized incident site protection, dismounted X-Ray processor/imager, trace explosive, CBRN and drug detection, unmanned aerial system, electric tools, gamma and neutron search and detection, final disposition, and render safe initiation.</p> <p>FY 2021 Base Plans: Review 1/3 of the Render Safe (RS) capabilities in anticipation of technical obsolescence, the changing threat, or an increase in capability that is deemed worthy of the additional investment. Render Safe capabilities to be reviewed in 2021 are Gamma/Neutron radiation detection, dismounted buried IED detection, X-Ray generator, dismounted X-Ray processor/imager. Activities include the conduct of a market survey, testing of equipment against objective requirements, reporting of findings and recommendations. Electronic countermeasures will continue to be tested and evaluated against emerging threats and loadset verification, validation, and release will continue.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	-	7.096	0.999	-	0.999

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 016 / Close Combat Capabilities ENG DEV

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding decrease from FY 2020 to FY 2021 is due to the high initial cost of the full suite of capabilities in the kit which primarily occurs in FY 2020 resulting in a decrease for FY 2021.					
Title: FY 2020 SBIR/STTR Transfer	-	0.872	-	-	-
Description: Funding transferred in accordance with Title 15 USC ?638					
FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638					
Accomplishments/Planned Programs Subtotals	7.454	19.198	7.591	-	7.591

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>
• R63610: Render Safe Sets kits Outfits	-	102.684	64.583	84.000	148.583	-	-	-	4.994	Continuing	Continuing

Remarks

D. Acquisition Strategy

The Next Generation Advanced Bomb Suit (NGABS) Program utilizes a competitive, developmental, innovative and efficient Other Transaction Authority (OTA) in EMD through the Fort Belvoir Sensor Communication and Electronic Consortium (SCEC) which will result in a production ready prototype leading to a competitive Production and Deployment (PD) phase for full capability while ensuring best value to the Army. Milestone (MS) B / Material Development Decision (MDD) occurred in FY 2018 and MS C is scheduled for FY 2022.

The Explosive Ordnance Disposal (EOD) Render Safe (RS) program utilizes existing government contract vehicles to acquire prototype systems for testing and evaluation of the systems for down selection and inclusion in the capabilities package during Engineering and Manufacturing Development. The program will continue to use the existing government contract vehicles for the production and deployment phase as well as to continue the development of capabilities during the 5 phase technical refresh.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 016 / Close Combat Capabilities ENG DEV
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
NGABS	Allot	PM SPE : Fort Belvoir	0.901	0.900		0.703		1.000		-		1.000	0.000	3.504	Continuing
Explosive Ordnance Disposal (EOD) Render Safe (RS)	Allot	PM CCS : Picatinny Arsenal, NJ	-	-		0.403	Jan 2020	-		-		-	0.000	0.403	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.872		-		-		-	0.000	0.872	-
Subtotal			0.901	0.900		1.978		1.000		-		1.000	0.000	4.779	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
NGABS - Production Prototype Development	C/FFP	TBD : Manufacturing Techniques Inc. (MTEQ), Lorton, VA	5.675	6.116		2.153		2.980		-		2.980	0.000	16.924	Continuing
EOD RS	MIPR	Various : Various	-	-		3.603	Jan 2020	-		-		-	0.000	3.603	Continuing
FY 2019 FFRDC / SBIR / STTR	TBD	TBD : TBD	-	0.438		-		-		-		-	0.000	0.438	-
Subtotal			5.675	6.554		5.756		2.980		-		2.980	0.000	20.965	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
NGABS Support Costs	MIPR	TBD : Various	1.711	-		0.703		2.146		-		2.146	0.000	4.560	Continuing
EOD RS	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	-	-		0.825	Jan 2020	0.500	Oct 2019	-		0.500	0.000	1.325	Continuing
EOD RS	MIPR	CCDC S5ISR : Aberdeen Proving Ground (APG), MD	-	-		0.503	Jan 2020	0.499	Oct 2019	-		0.499	0.000	1.002	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev				Project (Number/Name) 016 / Close Combat Capabilities ENG DEV							
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
Subtotal			1.711	-		2.031		3.145		-		3.145	0.000	6.887	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
NGABS Test & Evaluation	MIPR	TBD : Various	-	-		7.730		0.466		-		0.466	0.000	8.196	Continuing
EOD RS	MIPR	Various : Various	-	-		1.703	Jun 2020	-		-		-	0.000	1.703	Continuing
Subtotal			-	-		9.433		0.466		-		0.466	0.000	9.899	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
Project Cost Totals			8.287	7.454		19.198		7.591		-		7.591	0.000	42.530	N/A
Remarks															

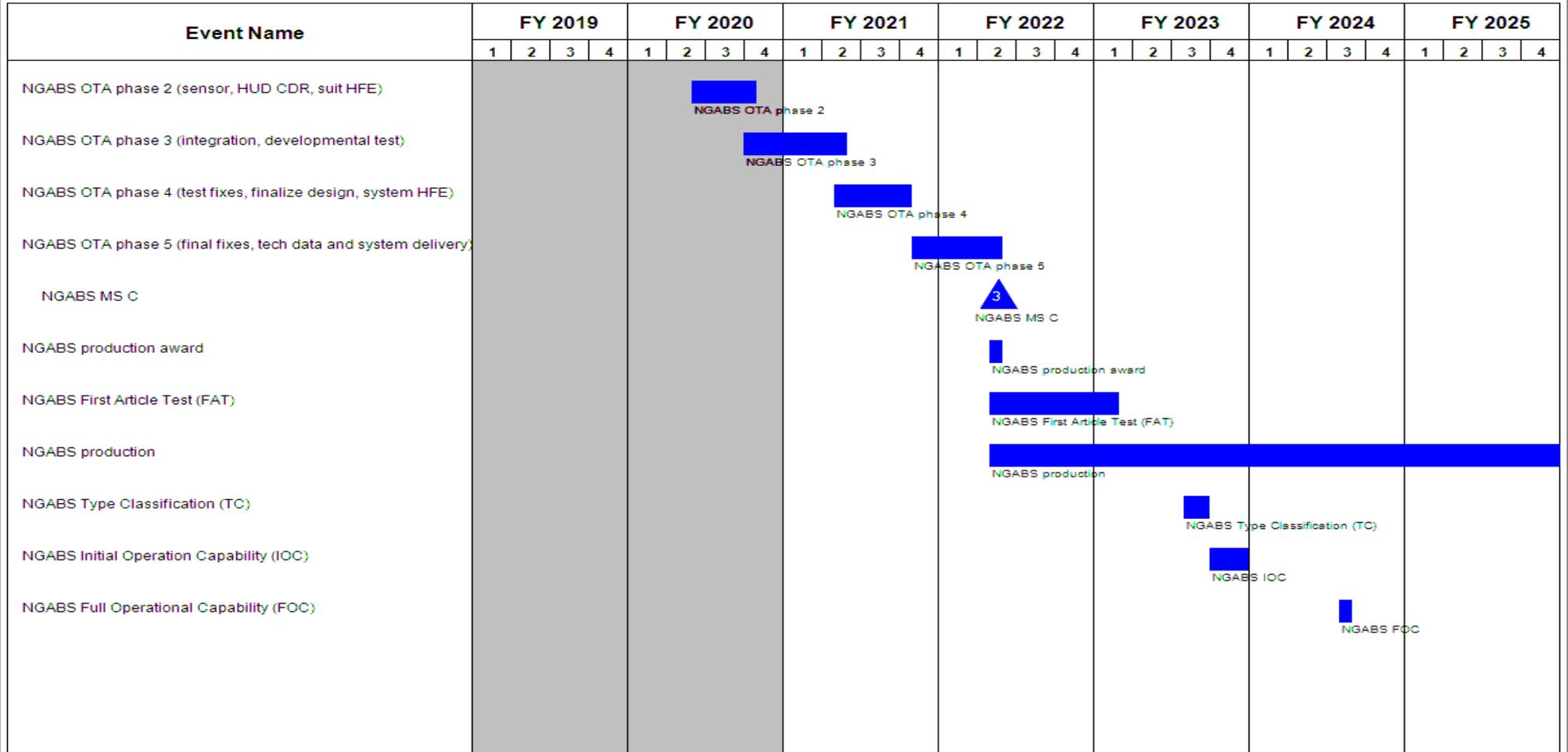
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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 016 / Close Combat Capabilities ENG 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																												
Explosive Ordnance Disposal (EOD) Render Safe (RS)																																																								
EOD RS Phase 0 Market Survey																													1 EOD RS Market Survey																											
EOD RS Phase 0 Prototype Testing																													Prototype Testing																											
EOD RS Phase 0 Solution Down Selection																													2 EOD RS Down Select																											
EOD RS Phase 0 Loadset Development																													Loadset Development																											
EOD RS Technical Refresh (5 Phases)																													Tech Reviews																											
EOD RS Radiation and XRAY Technical Refresh																													Phase 1 Tech Refresh																											
EOD RS Visual Augmentation Technical Refresh																													Phase 2 Tech Refresh																											
EOD RS Electronic Countermeasure Technical Refresh																													Phase 3 Tech Refresh																											
EOD RS Render Safe Initiation Technical Refresh																													Phase 4 Tech Refresh																											
EOD RS Unmanned Systems Payload Technical Refresh																													Phase 5 Tech Refresh																											
Next Generation Advanced Bomb Suit (NGABS)																																																								
NGABS OTA phase 1 (suit, sensors, HUD PDR/CDR)																													NGABS OTA phase 1																											

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 016 / Close Combat Capabilities ENG DEV



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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 016 / Close Combat Capabilities ENG DEV

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Explosive Ordnance Disposal (EOD) Render Safe (RS)	1	2021	4	2025
EOD RS Phase 0 Market Survey	1	2020	1	2020
EOD RS Phase 0 Prototype Testing	2	2020	2	2020
EOD RS Phase 0 Solution Down Selection	3	2020	3	2020
EOD RS Phase 0 Loadset Development	4	2020	4	2020
EOD RS Technical Refresh (5 Phases)	1	2021	4	2025
EOD RS Radiation and XRAY Technical Refresh	1	2021	4	2021
EOD RS Visual Augmentation Technical Refresh	1	2022	4	2022
EOD RS Electronic Countermeasure Technical Refresh	1	2023	4	2023
EOD RS Render Safe Initiation Technical Refresh	1	2024	4	2024
EOD RS Unmanned Systems Payload Technical Refresh	1	2025	4	2025
Next Generation Advanced Bomb Suit (NGABS)	1	2017	4	2024
NGABS Materiel Development Decision (MDD)	2	2018	2	2018
NGABS Milestone (MS) B	3	2018	3	2018
NGABS OTA phase 1 (suit, sensors, HUD PDR/CDR)	4	2019	2	2020
NGABS OTA phase 2 (sensor, HUD CDR, suit HFE)	2	2020	4	2020
NGABS OTA phase 3 (integration, developmental test)	4	2020	2	2021
NGABS OTA phase 4 (test fixes, finalize design, system HFE)	2	2021	4	2021
NGABS OTA phase 5 (final fixes, tech data and system delivery)	4	2021	2	2022
NGABS MS C	2	2022	2	2022
NGABS production award	2	2022	2	2022
NGABS First Article Test (FAT)	2	2022	1	2023

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 016 / <i>Close Combat Capabilities ENG DEV</i>

Events	Start		End	
	Quarter	Year	Quarter	Year
NGABS production	2	2022	4	2026
NGABS Type Classification (TC)	3	2023	3	2023
NGABS Initial Operation Capability (IOC)	4	2023	4	2023
NGABS Full Operational Capability (FOC)	3	2024	3	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev				Project (Number/Name) 415 / Mine Neutral/Detection			
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
415: Mine Neutral/Detection	-	31.807	17.910	1.998	-	1.998	5.995	6.994	0.000	0.000	0.000	64.704
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 415: This Project provides for Engineering Manufacturing and Development (EMD) for the next generation of capabilities to detect, identify and neutralize hybrid threats and explosive hazards such as Improvised Explosive Devices (IEDs) and landmines. These capabilities are a Family of Systems (FOS) encompassing handheld, vehicle mounted, small robotic mounted, aerial platform mounted and area access, and neutralization systems operating in manned, remotely controlled, semi-autonomous or fully autonomous modes. Continued development of this FOS is necessary to support Route Clearance Platoons located within both Engineer Companies and Brigade Engineering Battalion Brigade Combat Teams.

The Husky Mounted Detection System (HMDS) is a counter-explosive device capability that provides standoff detection and marking of metallic encased caches and metallic and low-metallic antitank landmines, unexploded ordnance, trigger mechanisms, and improvised explosive devices (IEDs) in support of route and area-clearance operations. HMDS is a mission equipment package mounted on the Husky route clearance vehicle. The program was restructured in September 2016 to align with emerging shallow buried Wire Detection (WD) capabilities integrated onto the HMDS Increment A1 configuration (includes Ground Penetrating Radar (GPR)). These changes are necessary to adapt to changing IED threats. WD Technology will be fully integrated through Engineering Change Proposals (ECPs) at the end of FY20. Prototypes developed under the concluded HMDS Increment A2 effort may be leveraged in development of future capabilities. Future capabilities may include detection of deep buried IEDs and caches, and semi-autonomous control of the Husky vehicle and HMDS from inside a follow-on vehicle.

Route Clearance & Interrogation System (RCIS) Type I consists of a semi-autonomous vehicle and includes designated control vehicles and Operator Control Units (OCUs) which provide a standoff capability to detect and neutralize the full spectrum of explosive hazards. Type I integrates a semi-autonomous kit onto a High Mobility Engineering Excavator (HMEE) for remote control from a Buffalo Mine Protected Clearance Vehicle (MPCV). RCIS Type I semi-autonomous kit will be integrated onto the HMEE and be capable of interrogating and classifying explosive hazards. An OCU will be integrated into a Buffalo MPCV for Type I. RCIS capabilities will be fielded to Route Clearance Squads and Engineer Platoons which includes Tele-operation, RADAR-based Follow-Me, LIDAR obstacle detection, onscreen predictive turning map, and customizable camera views in order to achieve the RCIS mission.

Standoff Robotic Explosive Hazard Detection System (SREHD), formerly known as the Autonomous Mine Detection System (AMDS), provides increased survivability through mine and explosive hazards stand-off detection, marking and neutralization capability for the dismounted soldier. It provides area access and freedom of movement for the Commander. SREHD consists of payload modules to be mounted on man-portable unmanned ground vehicles. The payloads are for surface laid and buried threats to include mines and explosive hazards. This capability allows a soldier to remain in a protective posture while detecting and neutralizing a wide variety of hybrid and conventional explosive threats. SREHD conducted a successful Milestone (MS) C in April 2018 and initiated Low Rate Initial Production (LRIP) in June 2018. Due to the realignment of funds from FY 2020 through FY 2024 to higher Army priorities, the proponent withdrew support to the Standoff Robotic Explosive Hazard Detection System (SREHD) after Low Rate Initial Production (LRIP) award. Research, Development, Test and Evaluation (RDTE) tasks will conclude in FY 2019 under FY 2018 PE 0654808A, Project 415, Landmine Warfare/Barrier - Eng Dev, once corrective action plans and trainer re-development are completed. The program will

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection
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conclude in June 2020 under FY 2018 OPA R68260 / AREA MINE DETECTION SYSTEM (AMDS) and PAA E50510 / DEMO KIT, BLASTING: Munition Array Charge, XM335 for system qualification and production and receipt of LRIP quantities for an orderly program closeout.

Robotic Explosive Hazard Detection System (REHDS) provides the warfighter with a robotic mounted capability to detect and mark buried landmines and IEDs from a safe standoff distance. REHDS is an enabler for Soldier Lethality as it guarantees soldier maneuverability by enhancing the probability and speed of detection of buried landmines and IEDs allowing for increased speed of dismounted operations making the unit more efficient and lethal. REHDS is a new start in FY 2021 and begins in the Engineering and Manufacturing Development (EMD) phase. REHDS will leverage developed SREHD capability and incorporate increased Rate of Advanced Downtrack (RoAD) and Integration to the Man Transportable Robotic System (MTRS) II platform. FY 2021 Total Base funding in the amount of \$1.998 million supports EMD activities for REHDS.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: HMDS Program Management Support</p> <p>Description: Husky Mounted Detection System (HMDS) Program Management Support</p> <p>FY 2020 Plans: Continue execution and management of Engineering Change Proposal (ECP) for Wire Detection, Infrared Illumination and Information Assurance compliance in preparation for Modification Work Order (MWO)</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: There are no FY 2021 Base Research, Development, Test & Evaluation (RDT&E) funds requested for this project.</p>	1.840	1.131	-	-	-
<p>Title: HMDS GPR: Engineer Change Proposal (ECP) to add Wire Detection and Infrared Illumination</p> <p>Description: HMDS A1 Tactical GPR: Engineer Change Proposal (ECP) to add Wire Detection and Infrared Illumination</p> <p>FY 2020 Plans: Will complete ongoing ECP efforts for Wire Detection, Infrared Illumination and Information Assurance compliance.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: There are no FY 2021 Base Research, Development, Test & Evaluation (RDT&E) funds for this project.</p>	15.223	1.773	-	-	-
<p>Title: HMDS Testing and Test Support activities</p> <p>Description: HMDS Testing and Test Support activities</p>	4.609	2.388	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020			
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection				
B. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
FY 2020 Plans: Will complete Risk Reduction and ECP testing						
FY 2020 to FY 2021 Increase/Decrease Statement: There are no FY 2021 Base Research, Development, Test & Evaluation (RDT&E) funds for this project.						
Title: HMDS A1 Auto-Height Improvements						
Description: Auto-Height Control						
FY 2020 Plans: Complete auto-height development and produce prototypes to support testing						
FY 2020 to FY 2021 Increase/Decrease Statement: There are no FY 2021 Base Research, Development, Test & Evaluation (RDT&E) funds requested for this project.						
Title: HMDS Systems Training Product Development						
Description: Training product development to support Developmental test and limited user testing						
FY 2020 Plans: Complete development activities to support Modification Work Order (MWO)						
FY 2020 to FY 2021 Increase/Decrease Statement: There are no FY 2021 Base Research, Development, Test & Evaluation (RDT&E) funds for this project.						
Title: HMDS Program and Logistics Support						
Description: Program and Logistics support						
FY 2020 Plans: Development of final logistics products to support logistics demo and Modification Work Order (MWO)						
FY 2020 to FY 2021 Increase/Decrease Statement: There are no FY 2021 Base Research, Development, Test & Evaluation (RDT&E) funds requested for this project.						
Title: RCIS Type I						
		0.892	0.648	-	-	-
		-	1.678	-	-	-
		7.507	6.893	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Description: Route Clearance & Interrogation System (RCIS) Type I provides standoff capability to detect and neutralize the full spectrum of explosive hazards.</p> <p>FY 2020 Plans: RCIS Type I: Continue the EMD phase - perform government safety testing with full up system level RCIS prototypes; perform cyber scans and analysis; continue logistics analysis; prep for MS C in FY21.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: RDTE funding for RCIS ends in FY 2020.</p>					
<p>Title: Multifunction Video Display (MVD)</p> <p>Description: Multifunction Video Display (MVD). Digital display used to control and view RCV enablers</p>	0.500	-	-	-	-
<p>Title: RCV & Enabler Improvements</p> <p>Description: Develop the hardware used to improve POR RCVs.</p>	0.425	-	-	-	-
<p>Title: Standoff Robotic Explosive Hazard Detection (SREHD) (Formerly AMDS)</p> <p>Description: Standoff Robotic Explosive Hazard Detection (SREHD) (AMDS)</p>	0.811	-	-	-	-
<p>Title: Robotic Explosive Hazard Detection System (REHDS)</p> <p>Description: Robotic Explosive Hazard Detection System (REHDS)</p> <p>FY 2021 Base Plans: Develop REHDS contract and conduct Materiel Development Decision.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: New Start in FY 2021.</p>	-	-	1.998	-	1.998
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	-	0.813	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding transferred in accordance with Title 15 USC 7638					
Accomplishments/Planned Programs Subtotals	31.807	17.910	1.998	-	1.998

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>
• R64001: HUSKY MOUNTED DETECTION SYSTEM (HMDS)	35.834	75.586	109.069	-	109.069	76.800	-	-	-	0.000	297.289
• R68102: GRND STANDOFF MINE DETECTN SYM (GSTAMIDS)BLK 1	42.001	40.680	2.497	-	2.497	-	-	-	-	0.000	85.178
• DA0924: Modification Of In Svc Equip	256.642	83.627	114.977	-	114.977	29.661	0.456	-	-	0.000	485.363
• R68260: AREA MINE DETECTION SYSTEM (AMDS)	5.797	-	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• 606: Cntrmn/Barrier Adv Dev	2.869	-	0.000	-	0.000	-	4.947	4.578	9.935	0.000	22.329
• M80400: Robotic Combat Support System (RCSS)	8.879	5.300	0.000	-	0.000	-	-	-	-	0.000	14.179
• E50510: DEMO KIT, BLASTING: Munition Array Charge, XM335	-	-	-	-	-	-	-	-	-	-	-
• R64003: HMDS - DEEP BURIED DETECTION	-	29.382	84.216	-	84.216	64.191	-	-	-	0.000	177.789

Remarks

D. Acquisition Strategy

The Husky Mounted Detection System (HMDS) program is pursuing an acquisition approach that delivers capability increments - Increment A, Configuration 1 (A1) to the Warfighter by leveraging the Quick Reaction Capability (QRC) Ground Penetrating Radar (GPR) currently deployed in support of Operation Enduring Freedom (OEF) and Operation Inherent Resolve (OIR). In FY 2020, the program will complete execution of an Engineering Change Proposals (ECP) to add a wire detection capability to address evolving threat, and Infrared illumination to enable nighttime operation, improve operational availability of the HMDS during inclement weather and address obsolescence and Cyber Security deficiencies.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 415 / <i>Mine Neutral/Detection</i>
<p>The Route Clearance & Interrogation System (RCIS) program executes an Engineering Manufacturing and Development (EMD) phase for Type I systems with an OEM contract award for Delta High Mobility Engineering Excavator (HMEE) support and a contract award in 4th quarter of FY 2018 to one EMD contractor for the Semi-Autonomous Control (SAC) Kit . The SAC Kit was awarded based on a source selection from full and open competition. The SAC EMD contract awardee will execute Preliminary Design Review (PDR), design, integration, and build phase of seven Semi-Autonomous Capability (SAC) kits, integrated onto six vehicles, with one kit available for engineering and System Integration Lab (SIL) evaluations. These assets enable the Government to execute a full Pre-Production Qualification Test (PPQT) and to evaluate against Capability Production Document (CPD) and performance specification requirements. Production and Technical Data Package (TDP) procurement options on the EMD contract take advantage of competition to assist in cost reduction. The RCIS Type I program Lifecycle Cost Estimate (LCCE), and associated budget request, was updated based on costs associated with modifying the base HMEE platform to accept the SAC kit, changes in the acquisition strategy and alignment of development and test activities in support of a production decision. To support EMD, ALUGS is funding Reset/Recap of four Buffalo Mine Protected Clearance Vehicle (MPCV) test assets at Letterkenny Army Depot. These will be provided to the SAC contractor for Operator Control Unit (OCU) integration.</p> <p>The Standoff Robotic Explosive Hazard Detection System (SREHD) (formerly known as AMDS) is currently in the Low Rate Initial Production (LRIP) phase to provide standoff detection, marking, and neutralization of explosive hazards (e.g., landmines, improvised explosive devices (IED), booby-traps (explosive), and unexploded ordnance (UXO)) in complex and urban terrain, including confined areas and subterranean environments (e.g., buildings, bunkers, tunnels, etc.). Transition to Low Rate Initial Production (LRIP) occurred 30 April 2018 under PAA E50510 / DEMO KIT, BLASTING: Munition Array Charge, XM335, for the neutralization capability, as well under OPA R68260 / AREA MINE DETECTION SYSTEM (AMDS) for the detection and marking capabilities. Due to the realignment of funds beginning FY 2020 through FY 2024 to higher Army priorities, the proponent withdrew support to the Standoff Robotic Explosive Hazard Detection System (SREHD) after Low Rate Initial Production (LRIP) award. Subsequently, the Milestone Decision Authority (MDA) directed that FY 2019 funding will not be executed for this program. Due to timing, funding is still reflected in FY 2019. Research, Development, Test and Evaluation (RDTE) tasks will conclude in FY 2019 under FY 2018 PE 0654808A, Project 415, Landmine Warfare/Barrier - Eng Dev, once corrective action plans and trainer re-development are completed. The program will conclude in June 2020 under FY 2018 OPA R68260 / AREA MINE DETECTION SYSTEM (AMDS) and PAA E50510 / DEMO KIT, BLASTING: Munition Array Charge, XM335 for system qualification and production and receipt of LRIP quantities for an orderly program closeout.</p> <p>Robotic Explosive Hazard Detection System (REHDS) is a new start in FY 2021 and begins in the Engineering Manufacturing Development (EMD) phase. REHDS will develop the capability to detect and mark explosive hazards from a robotic platform to deliver standoff capability to the warfighter. REHDS will leverage developed SREHDS capability and incorporate the following two changes: Increased Rate of Advanced Downtrack (RoAD) and Integration to Man Transportable Robotic System (MTRS) II platform. REHDS has planned efforts in FY 2022 and FY 2023; dollar amounts are \$6.000 million and \$7.000 million respectively. Plan to execute a sole source strategy utilizing the SREHD contractor as they have the ability to develop similar systems.</p>		

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
HMDS System Engineering & Program Management	MIPR	PM Terrestrial Sensors : Fort Belvoir. VA	1.750	1.840	Jan 2019	1.179	Mar 2020	-		-		-	0.000	4.769	-
Program Management - RCIS Type I	MIPR	PM FP : Warren, MI	4.213	0.769	Oct 2018	0.582	Oct 2019	-		-		-	Continuing	Continuing	-
SREHD (Formerly AMDS) Program Management	Allot	JPEO A&A, PM CCS : Picatinny Arsenal, NJ	3.868	-		-		-		-		-	0.000	3.868	-
SREHD (Formerly AMDS) Program Closeout	Allot	JPEO A&A, PM CCS : Picatinny Arsenal, NJ	-	0.811	Dec 2018	-		-		-		-	0.000	0.811	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.813		-		-		-	0.000	0.813	-
Subtotal			9.831	3.420		2.574		-		-		-	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
HMDS A1 Dev of Engineering Change Proposal w/ Wire Detect and InfraRed	SS/FFP	Chemring Sensors & Electronic Systems (CSES) : Dulles, VA	8.437	15.223	Jan 2019	1.821	Nov 2019	-		-		-	0.000	25.481	-
HMDS Auto-height improvements	C/CPFF	TBD : TBD	-	-		2.634	Nov 2019	-		-		-	0.000	2.634	-
HMDS Systems Training Product Development	MIPR	CECOM : Various	-	0.892	Nov 2018	0.696	Nov 2019	-		-		-	0.000	1.588	-
RCIS Type I	SS/FFP	J C Bamford : Pooler, GA	9.233	1.810	Nov 2018	1.542	Oct 2019	-		-		-	0.000	12.585	Continuing
RCIS Type I test assets	MIPR	Letterkenny Army Depot : Letterkenny, PA	2.252	-		-		-		-		-	0.000	2.252	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
RCIS Type I SAC	C/CPIF	QinetiQ : Waltham, MA	-	3.700	Nov 2018	3.383	Oct 2019	-		-		-	Continuing	Continuing	-
Multi-Function Video Display	MIPR	NVESD : Fort Belvoir, VA	3.972	0.500	Oct 2018	-		-		-		-	3.047	7.519	3.047
Buffalo MPCV Interrogation Arm Improvements	C/CPFF	KRC : Houghton, MI	-	0.425	Nov 2018	-		-		-		-	0.000	0.425	-
SREHD (Formerly AMDS) EMD and Trainer Re-development	C/CPIF	Carnegie Robotics LLC : Pittsburgh, PA	30.889	-		-		-		-		-	0.000	30.889	-
SREHD (Formerly AMDS) RAMS Type B Integration with Trainer	MIPR	ARL : Adelphi, MD	0.300	-		-		-		-		-	0.000	0.300	-
Subtotal			55.083	22.550		10.076		-		-		-	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
HMDS - Program and Logistics Support	MIPR	Various : Various	-	-		1.727	Nov 2019	-		-		-	0.000	1.727	-
RCIS Type I	MIPR	TARDEC, TACOM : Warren, MI	7.588	0.768	Oct 2018	0.332	Oct 2019	-		-		-	Continuing	Continuing	-
SREHD (Formerly AMDS)	MIPR	Various : Various	13.676	-		-		-		-		-	0.000	13.676	-
Robotic Explosive Hazard Detection System	MIPR	CCDC - Picatinny : Picatinny Arsenal, NJ	-	-		-		1.998	Mar 2021	-		1.998	0.000	1.998	-
Subtotal			21.264	0.768		2.059		1.998		-		1.998	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 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection
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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			
HMDS ATEC Testing	MIPR	ATEC : Alexandria, VA	5.045	3.717	Mar 2019	1.936	Nov 2019	-		-		-	0.000	10.698	-
HMDS Test Support	MIPR	CECOM : Various	-	0.892	Nov 2018	0.433	Nov 2019	-		-		-	0.000	1.325	-
RCIS Type I	MIPR	ATEC : Aberdeen, MD	1.772	0.460	Nov 2018	0.832	Oct 2019	-		-		-	0.000	3.064	-
SREHD (Formerly AMDS)	MIPR	OTC : Ft. Hood, TX	4.341	-		-		-		-		-	0.000	4.341	-
SREHD (Formerly AMDS)	MIPR	ARL : Adelphi, MD	0.100	-		-		-		-		-	0.000	0.100	-
Subtotal			11.258	5.069		3.201		-		-		-	0.000	19.528	N/A
Project Cost Totals			97.436	31.807		17.910		1.998		-		1.998	Continuing	Continuing	N/A

Remarks
 Due to the realignment of funds FY 2020-2024 to higher Army priorities, the proponent withdrew support to the Standoff Robotic Explosive Hazard Detection System (SREHD) after Low Rate Initial Production (LRIP) award. Subsequently, the Milestone Decision Authority (MDA) directed that FY 2019 funding will not be executed for this program. Due to timing, funding is still reflected in FY 2019. Research, Development, Test and Evaluation (RDTE) tasks will conclude in FY 2019 under FY 2018 PE 0654808A, Project 415, Landmine Warfare/Barrier - Eng Dev, once corrective action plans and trainer re-development are completed. The program will conclude in June 2020 under FY 2018 OPA R68260 / AREA MINE DETECTION SYSTEM (AMDS) and PAA E50510 / DEMO KIT, BLASTING: Munition Array Charge, XM335 for system qualification and production and receipt of LRIP quantities for an orderly program closeout.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection

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
HMDS																												
HMDS Increment A1-IOC	▲ 1 A1 IOC																											
HMDS Increment A1 Award ECP for WD	A1 ECP WD																											
HMDS Risk Reduction/ECP	A1 V1 RR/ECP																											
HMDS Increment A1 w/WD FUE																												▲ 4 HMDS ECP w/WD FUE
HMDS Testing																												
RCIS Type I																												
RCIS Type I EMD SAC Contract	EMD SAC Contract																											
RCIS Type I EMD Delta HMEE contract	EMD Support contract																											
RCIS Type I Testing																												RCIS Type I testing
RCIS Type I CDR	▲ 2 GDR																											
RCIS Type I TRR																												▲ 3 TRR
Standoff Robotic Explosive Hazard Detection System (SREHD) (Formerly AMDS)																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection

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
SREHD Trainer Re-development	Trainer Re-development																											
SREHD Corrective Action Period (CAP)	CAP																											
SREHD FAT Build	FAT Build																											
SREHD Product Verification Test (PVT)	PVT																											
SREHD First Article Test (FAT)	FAT																											
SREHD LRIP Build	LRIP Build																											
SREHD LRIP Deliveries	LRIP Deliveries																											
Robotic Explosive Hazard Detection System (REHDS)																												
Develop/award REHDS Contract																												
MDD									5																			
Integration Engineering																												
Risk Reduction Testing																												
Protytype build																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 415 / <i>Mine Neutral/Detection</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				
Product Qualification Testing																	■				▲ 6				▲ 7							
MS C																																
Production Contract Award																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 415 / <i>Mine Neutral/Detection</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
HMDS	1	2016	1	2023
HMDS Increment A1 - MS C Review	4	2017	4	2017
HMDS Increment A1-TC/MR	3	2018	3	2018
HMDS Increment A1-FUE	3	2018	3	2018
HMDS Increment A1-IOC	3	2019	3	2019
HMDS Increment A1 Award ECP for WD	3	2018	4	2020
HMDS Risk Reduction/ECP	2	2017	1	2021
HMDS Increment A1 w/WD FUE	4	2020	4	2020
HMDS Testing	2	2018	1	2021
RCIS Type I	1	2015	4	2022
RCIS Type I MS B	4	2018	4	2018
RCIS Type I EMD SAC Contract	4	2018	4	2020
RCIS Type I EMD Delta HMEE contract	2	2019	4	2020
RCIS Type I Testing	2	2020	4	2020
RCIS Type I CDR	3	2019	3	2019
RCIS Type I TRR	3	2020	3	2020
Standoff Robotic Explosive Hazard Detection System (SREHD) (Formerly AMDS)	1	2018	4	2022
SREHD Regression Testing	1	2018	2	2018
SREHD Milestone C	3	2018	3	2018
SREHD Trainer Re-development Contract Modification	3	2018	3	2018
SREHD Low Rate Initial Production (LRIP) Award	3	2018	3	2018
SREHD Trainer Re-development	3	2018	3	2019

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 415 / <i>Mine Neutral/Detection</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
SREHD Corrective Action Period (CAP)	4	2018	2	2019
SREHD FAT Build	2	2019	3	2019
SREHD Product Verification Test (PVT)	3	2019	4	2019
SREHD First Article Test (FAT)	4	2019	4	2019
SREHD LRIP Build	4	2019	3	2020
SREHD LRIP Deliveries	4	2019	3	2020
Robotic Explosive Hazard Detection System (REHDS)	1	2021	4	2025
Develop/award REHDS Contract	1	2021	1	2022
MDD	2	2021	2	2021
Integration Engineering	1	2022	1	2023
Risk Reduction Testing	1	2023	4	2025
Protyype build	2	2023	3	2023
Product Qualification Testing	3	2023	4	2023
MS C	2	2024	2	2024
Production Contract Award	2	2024	2	2024

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	163.229	129.974	162.513	-	162.513	156.333	106.957	90.035	81.010	Continuing	Continuing
323: <i>Common Hardware Systems</i>	-	4.695	5.481	4.998	-	4.998	5.029	5.005	4.998	4.995	Continuing	Continuing
C29: <i>Centralized Technical Support Facility (CTSF)</i>	-	8.585	8.637	7.164	-	7.164	0.000	0.000	0.000	0.000	0.000	24.386
C34: <i>Army Tac C2 Sys Eng</i>	-	7.661	9.483	9.706	-	9.706	11.974	11.694	11.075	11.378	Continuing	Continuing
EJ4: <i>COMMAND POST COMPUTING ENVIRONMENT (CPCE)</i>	-	33.693	30.969	27.489	-	27.489	27.470	27.406	27.403	27.515	Continuing	Continuing
EJ5: <i>MOUNTED COMPUTING ENVIRONMENT (MCE)</i>	-	18.463	10.464	18.582	-	18.582	22.145	20.091	17.571	17.887	Continuing	Continuing
EJ6: <i>TACTICAL ENHANCEMENT</i>	-	10.085	0.000	7.860	-	7.860	0.000	0.000	0.000	0.000	0.000	17.945
EK9: <i>TACTICAL NETWORK OPERATIONS AND MANAGEMENT</i>	-	7.631	3.649	3.375	-	3.375	0.000	0.000	0.000	0.000	0.000	14.655
EQ8: <i>Mobile/Handheld Computing Environment (M/HHCE)</i>	-	9.130	4.857	5.155	-	5.155	5.163	5.172	5.180	5.247	Continuing	Continuing
ER9: <i>Expeditionary Army Command Post</i>	-	33.052	28.895	58.436	-	58.436	53.195	20.089	9.998	0.000	0.000	203.665
EW3: <i>Unit Task Reorganization (UTR) Development</i>	-	30.234	27.539	19.748	-	19.748	31.357	17.500	13.810	13.988	Continuing	Continuing

A. Mission Description and Budget Item Justification

This funding line supports the Army Network Modernization Strategy LOE 1, Unified Network, LOE 2 - Common Operating Environment and LOE 4 - Command posts. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

Project 323, the Common Hardware Systems (CHS), is an ACAT III program and is a mandated Army Strategic Source that acquires and sustains highly flexible, cost effective, and simplified non developmental C5ISR solutions that integrates the latest and emerging commercial technology onto the Converged Mission Command

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	
<p>Network. This funding line supports the Army Network Modernization Strategy LOE 2, Common Operating Environment. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy. CHS provides technical support, environmental and survivability testing, system design, end of life/configuration management, and strengthens cybersecurity/supply chain risk management across Army tactical programs to ensure interoperability and integration of hardware throughout the computing infrastructure. CHS continuously analyzes and tracks hardware from cradle-to-grave, from emerging technology until end-of-life. CHS conducts hardware evaluations that facilitate and simplify the selection of common hardware solutions across numerous Army programs and agencies including: Mission Command; Tactical Network; Tactical Radios; Distributed Common Ground Station Army; Aviation Systems; Counter Rocket, Artillery, Mortar; Communication Electronics Command; Combat Capabilities Development Command (CCDC), among others. CHS rapidly procures common hardware configurations across the Integrated Tactical Network (ITN), Common Operating Environment (COE), the sustainment community, and tactical programs that enables the continuous modernization in support of all four Network Modernization Lines of Effort and Network Cross Functional Team (CFT) requirements. CHS logistical services include worldwide 72 hour turnaround repair through strategically located support centers for tactical military units, tailorable supply chain and cybersecurity measures, manages customizable warranty, maintenance and failure rate reporting, and technical support services to support specific Army program requirements. CHS supports better buying power initiatives by creating efficiencies through economies of scale, price breaks, streamlined processes, reduced cycle times, and centralized contracting.</p> <p>Project C29, the Central Technical Support Facility (CTSF), is the Army's single strategic facility responsible for executing Army Interoperability Certification (AIC) system of system verification/validation checkout, testing, and configuration management for the Army's LandWarNet Baseline. The Centralized Technical Support Facility (CTSF) funding line supports the Army's Network Modernization Strategy Line of Effort LOE 1B Network Enabling Functions.</p> <p>Project C34, the Army Tac C2 Sys Eng project funds the PEO Command, Control, Communications-Tactical (PEO C3T) the System-of-Systems engineering, Enterprise and Integration efforts. The system engineering efforts are to facilitate the overall network interoperability of all the various programs that must be able to seamlessly connect together while addressing their individual distinct requirements. Efforts address continuing evolution of the network within the PEO C3T portfolio of technology across capability enhancement packages, in line with the Network CFT capability set strategy, to deliver efficient and effective cross-domain technical solution.</p> <p>Project EJ4, the Command Post Computing Environment (CPCE), is one of the computing environments under the Common Operating Environment (COE) initiative, a major Army Network Modernization Strategy Line of Effort of the Network Cross-Functional Team (N-CFT). CPCE provides a common software infrastructure framework (common interface, data, and services) upon which future Warfighter capabilities can be built. CPCE development efforts initially target Movement and Maneuver capability development at tactical echelons that span from Army Service Component Commands (ASCC) to Battalion level. The CPCE will be the central computing environment developed to support command posts and combat operations, and will be interoperable with Mounted and Mobile/Handheld systems.</p> <p>Project EJ5, the Mounted Computing Environment (MCE), is one of the six computing environments (CEs) formalized by the AAE under the Common Operating Environment (COE) initiative. MCE standardizes end-user environments and enables streamlined deployment of new warfighting applications while leveraging existing hardware under the Joint Battle Command - Platform program. Requirements for the MCE are established in the AROC approved COE Information Systems Initial Capability Document (IS ICD) and the approved Mounted Computing Environment Requirements Definition Package (RDP). The MCE will provide incremental improvements with additional application capabilities over time, and will be interoperable with Command Post and Mobile/Handheld systems.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	
<p>Project EJ6, Tactical Enhancement supports the evaluation and testing requirements for Terrestrial Transmission (TRILOS) and Troposcatter Transmission (TROPO) capabilities procured and fielded under the Signal Modernization (SIGMOD) funding line, B00010. TRILOS and TROPO will provide redundancy communications in a Satellite denied environment by providing improved Line of Sight and beyond line of sight radio systems. In addition this funding will support development of Network Centric Waveform-Resilient (NCW-R). NCW-R is a critical, near-term set of modifications to the current WIN-T SATCOM waveform that will provide limited protection against our adversaries' ability to jam tactical SATCOM Command and control communications on Wideband Global SATCOM (WGS) satellites. NCW-R will provide anti-jam capability and resiliency to WIN-T Program of Record satellite terminals in contested environments. The NCW-R waveform software will operate on WIN-T satellite modems. NCW-R will provide a bridging capability until the next generation protected satellite constellation is launched by the Air Force (projected FY 2028/2029). The current anti-jam protection is limited to two SMART-T terminals per BCT, division and Corps HQs, leaving battalions vulnerable to being isolated during jamming events.</p> <p>Project EK9, Tactical Networks Operational Management (TNOM)'s purpose is to create Unified Network Operations (UNO). UNO is a software based, integrated NetOps capability being developed, as a rapid prototype - proceeding under Section 804, mid-tier acquisition (MTA) authority granted by the Army Acquisition Executive (AAE)'s 14 May 2019 Acquisition Decision Memorandum (ADM). Enabling common planning, configuration, monitoring, provisioning, management, and defense of the Network, UNO configures and integrates tactical and enterprise networks to allow delivery of information and communications among Soldiers at all echelons utilizing network resources prioritized according to the Commander's intent. In developing UNO, TNOM follows the Army's development operations (DevOps) approach - creating NetOps prototypes, gaining user feedback, making adjustments and ultimately delivering enhanced capabilities to the operational force in the shortest time possible. UNO development incorporates solutions available in industry and through government agencies - assessing them in an adapt and buy approach informed by experimentation, demonstration, and modernization.</p> <p>Project EQ8, Mobile/Handheld Computing Environment, supports the Nett Warrior (NW) Program (named in honor of Medal of Honor recipient Colonel Robert C. Nett), also known as the Ground Soldier System (GSS) Program. The program leverages commercial smart devices and secure Army tactical radios to provide the dismounted leader an integrated mission command and situational awareness system for use during combat operations. The NW system provides leaders electronic real-time information on friendly positions; information about enemy activity and movement; navigational data and map imagery; a collaborative planning tool; and other mission related graphics which effectively puts the power of the entire Army tactical network in the hands of the dismounted leader.</p> <p>Project ER9, Command Post Integrated Infrastructure (CPI2), fields mobile Command Post nodes by integrating mission command solutions to enhance the survivability and mobility of command post formations. CPI2 will replace selected elements of the legacy command post to provide improved expeditionary capability, survivability, agility, and scalability for command post formations at all echelons. By integrating mission command warfighting functions on to formation appropriate vehicle platforms, a dispersed command post construct will enable the battle staff to blend in with the overall maneuver formation while giving the commander the ability to synchronize the close fight on the move.</p> <p>Project EW3, Unit Task Reorganization (UTR) funding line supports the Army Network Plan Framework objective to deliver a Standards Based Network Architecture. This will enable modernizing the Mission Command Network through the coordination of a common set of network operations tools and infrastructure development supporting the unit communication staff's ability to conduct Network Planning, Network Provisioning and Network Management. Network Planning efforts include the development of an integrated planning tool suite to improve Signal Soldiers ability to plan and develop configurations for upcoming operations and deployments.</p>		

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>
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Network Provisioning efforts include development of tools and technology that provide a means to deliver configurations developed during the Network Planning with little to no manual involvement by the Soldier. Network Management efforts replace stove-piped management systems and replaces them with integrated tools that provide a consolidated, as well as detailed, view of the network and its components.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	169.607	140.637	143.727	-	143.727
Current President's Budget	163.229	129.974	162.513	-	162.513
Total Adjustments	-6.378	-10.663	18.786	-	18.786
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-10.663			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-6.378	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	18.786	-	18.786

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

Project: EW3: *Unit Task Reorganization (UTR) Development*
 Congressional Add: *Secure Wireless - Small Form Fit Factor*

	FY 2019	FY 2020
Congressional Add Subtotals for Project: EW3	5.017	-
Congressional Add Totals for all Projects	5.017	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) 323 / Common Hardware Systems			
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
323: Common Hardware Systems	-	4.695	5.481	4.998	-	4.998	5.029	5.005	4.998	4.995	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

CHS is an ACAT III program and is a mandated Army Strategic Source that acquires and sustains highly flexible, cost effective, and simplified non developmental C5ISR solutions that integrates the latest and emerging commercial technology onto the Converged Mission Command Network. This funding line supports the Army Network Modernization Strategy LOE 2, Common Operating Environment. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

CHS provides technical support, environmental and survivability testing, system design, end of life/configuration management, and strengthens cybersecurity/supply chain risk management across Army tactical programs to ensure interoperability and integration of hardware throughout the computing infrastructure. CHS continuously analyzes and tracks hardware from cradle-to-grave, from emerging technology until end-of-life. CHS conducts hardware evaluations that facilitate and simplify the selection of common hardware solutions across numerous Army programs and agencies including: Mission Command; Tactical Network; Tactical Radios; Distributed Common Ground Station Army; Aviation Systems; Counter Rocket, Artillery, Mortar; Communication Electronics Command; Combat Capabilities Development Command (CCDC), among others. CHS rapidly procures common hardware configurations across the Integrated Tactical Network (ITN), Common Operating Environment (COE), the sustainment community, and tactical programs that enables the continuous modernization in support of all four Network Modernization Lines of Effort and Network Cross Functional Team (CFT) requirements. CHS logistical services include worldwide 72 hour turnaround repair through strategically located support centers for tactical military units, tailorable supply chain and cybersecurity measures, manages customizable warranty, maintenance and failure rate reporting, and technical support services to support specific Army program requirements. CHS supports better buying power initiatives by creating efficiencies through economies of scale, price breaks, streamlined processes, reduced cycle times, and centralized contracting.

CHS is a model for modern acquisition strategy that provides hardware solutions including servers, storage, clients, networking devices, tactical radios, ruggedized platforms, hand held end devices, operational transit cases, installation kits, and peripheral devices procured from a mix of numerous small and large businesses. CHS is partnered with the CECOM Integrated Logistics Support Center (ILSC) to develop a model for sustaining COTS IT using the Standard Army Supply System. CHS maintains a Public Private Partnership (P3) with Tobyhanna Army Depot in order to leverage the innovation, resources and leadership skills of both TYAD and CHS in order to provide the best value to the Soldier.

CHS supports Better Buying Power (BBP) initiatives by creating efficiencies on a micro and macro level through volume discounting, economies of scale, the elimination of duplication of effort, reduced barriers to entry, price breaks, streamlined processes, reduced cycle times, and centralized contracting. CHS provides the Army with a highly efficient Return on Investment (ROI), approximately 33:1.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) 323 / Common Hardware Systems		
FY 2021 funds support CHS to continue enabling the streamlined and rapid acquisition and delivery of CHS equipment and associated logistical services in support of customer requirements. It will support technology insertions, enable hardware and systems engineering, evaluations, and CHS-6 contract pre-award activities.				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Title: Acquisition Support</p> <p>Description: Funding is provided for the following effort.</p> <p>FY 2020 Plans: Will continue acquisition support for CHS and customer programs. CHS rapidly procures common hardware configurations across the Common Operating Environment (COE), the sustainment community, and tactical programs that enables the continuous modernization of a converged network. PMO costs will be covered by OMA funding.</p> <p>FY 2021 Plans: Will continue acquisition support for CHS and customer programs. CHS rapidly procures common hardware configurations across the Common Operating Environment (COE), the sustainment community, and tactical programs that enables the continuous modernization of a converged network. PMO costs will be covered by OMA funding.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Rapid Acquisition and Procurement Integrated Database System (RAPIDS) has been developed; development costs will decrease as future efforts will only include enhancements to the existing baseline system.</p>		2.699	3.250	2.552
<p>Title: Logistical Service Support</p> <p>Description: Funding is provided for the following effort.</p> <p>FY 2020 Plans: CHS logistical services include worldwide 72-hour turnaround repair through strategically located support centers for tactical military units, tailorable supply chain and cybersecurity measures, manages customizable warranty, maintenance and failure rate reporting, and technical support services to support specific Army program requirements.</p> <p>FY 2021 Plans: CHS logistical services include worldwide 72-hour turnaround repair through strategically located support centers for tactical military units, tailorable supply chain and cybersecurity measures, manages customizable warranty, maintenance and failure rate reporting, and technical support services to support specific Army program requirements.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Logistical service support for FY 2020 and FY 2021 has a small decline.</p>		0.439	0.339	0.441
<p>Title: Technical and Test Support</p>		1.557	1.643	1.805

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) 323 / Common Hardware Systems		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Description: Funding is provided for the following effort.</p> <p>FY 2020 Plans: CHS provides technical support, environmental and survivability testing, system design, end of life/configuration management, and strengthens cyber security/supply chain management across Army tactical programs to ensure interoperability and integration of hardware throughout the computing infrastructure. CHS conducts hardware evaluations that facilitate and simplify the selection of common hardware solutions across numerous Army programs and agencies.</p> <p>FY 2021 Plans: CHS provides technical support, environmental and survivability testing, system design, end of life/configuration management, and strengthens cyber security/supply chain management across Army tactical programs to ensure interoperability and integration of hardware throughout the computing infrastructure. CHS conducts hardware evaluations that facilitate and simplify the selection of common hardware solutions across numerous Army programs and agencies.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Technical and test support for FY2020 and FY2021 has a small decline.</p>				
<p>Title: Contract Support Services</p> <p>Description: Funding is provided for the following effort.</p> <p>FY 2021 Plans: Contract Support Services are required to provide continuing expedited acquisition support for customer procurements.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Contract Support Services required due to emphases on using commercial IT support for Army Tactical Networks.</p>		-	-	0.200
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638</p>		-	0.249	-
Accomplishments/Planned Programs Subtotals		4.695	5.481	4.998

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) 323 / Common Hardware Systems

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

Remarks

D. Acquisition Strategy

CHS is currently executing an approved acquisition strategy to facilitate the procurement of Commercial IT through a single step, full and open competition contract. The CHS-5 contract was awarded on 24 AUG 2018; 5 years/IDIQ. A single prime vendor was selected as the program integrator. The CHS-5 contract provides seamless, rapid, and consolidated procurement of commercial IT, customizable sustainment strategies, non-personal services, and continuous technology upgrades to support tactical programs fielding schedules, configuration management, and ruggedization.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) 323 / Common Hardware Systems
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.249		-		-		-	0.000	0.249	-
Subtotal			-	-		0.249		-		-		-	0.000	0.249	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support Costs	C/FP	Various : Various	83.563	-		-		-		-		-	0.000	83.563	-
Product Procurement	C/FP	Various : Various	92.177	-		-		-		-		-	0.000	92.177	-
Technology Insertion	C/FP	Various : Various	17.780	-		-		-		-		-	0.000	17.780	-
CHS-5 Non-Recurring Engineering	C/FP	Various : Various	0.472	-		-		-		-		-	0.000	0.472	-
Acquisition Support	C/FP	Various : Various	2.853	2.699	Dec 2018	3.250	Dec 2019	2.552	Dec 2020	-		2.552	Continuing	Continuing	Continuing
Logistical Service Support	C/FP	Various : Various	0.623	0.439	Dec 2018	0.339	Dec 2019	0.441	Dec 2020	-		0.441	Continuing	Continuing	Continuing
Technical & Test Support	C/FP	Various : Various	1.557	1.557	Dec 2018	1.643	Dec 2019	1.805	Dec 2020	-		1.805	Continuing	Continuing	Continuing
Subtotal			199.025	4.695		5.232		4.798		-		4.798	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Contract Support Services	SS/CR	APG, MD : APG, MD	-	-		-		0.200	Dec 2020	-		0.200	0.000	0.200	-
Subtotal			-	-		-		0.200		-		0.200	0.000	0.200	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
Project Cost Totals			199.025	4.695	5.481	4.998	-	4.998	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) 323 / Common Hardware Systems

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 Insertion & Technical Support (Adding New Hardware)	[Redacted]																															
Environmental and First Article Testing	[Redacted]																															
RESET and Deep Cleaning/Out of Warranty Repair	[Redacted]																															
HW Implementation, Integration and Evaluation	[Redacted]																															
CHS-4 Hardware Deliveries	[Redacted]				[Redacted]																											
CHS-5 Hardware Deliveries	[Redacted]																															
CHS-6 Pre-Contract Award	[Redacted]																															
CHS-6 Award	[Redacted]																															

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) 323 / Common Hardware Systems

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Technology Insertion & Technical Support (Adding New Hardware to Contract)	1	2007	4	2025
Environmental and First Article Testing	1	2006	4	2025
RESET and Deep Cleaning/Out of Warranty Repair	1	2006	4	2025
HW Implementation, Integration and Evaluation	1	2006	4	2025
CHS-4 Hardware Deliveries	1	2012	4	2019
CHS-5 Contract Award	4	2018	4	2018
CHS-5 Hardware Deliveries	4	2018	3	2023
CHS-6 Pre-Contract Award	2	2020	2	2023
CHS-6 Award	2	2023	2	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)			
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
C29: Centralized Technical Support Facility (CTSF)	-	8.585	8.637	7.164	-	7.164	0.000	0.000	0.000	0.000	0.000	24.386
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project C29, The Centralized Technical Support Facility (CTSF): The CTSF is the Army's premier test and certification facility for System of Systems interoperability, functioning as CIO/G6's designated independent test agent and Land/WarNet/Mission Command (LWN/MC) configuration manager. The Central Technical Support Facility's (CTSF) directed mission is to perform Army Interoperability Certification (AIC) testing and configuration management for all operational through tactical level Command, Computing, Control, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) systems (individual, family, and system of systems), applications, and hardware prior to release to the field. The CTSF accomplishes this through the enforcement of a standards based architecture while supporting the development and implementation of an integrated computing infrastructure and a converged network. The CTSF provides validated test data to the Department of the Army and Joint agencies to accredit interoperability certifications. The distributed test environment of the CTSF is accomplished through the Federation of Net-centric Sites (FaNS) construct. This FaNS construct addresses distributed integration development and testing using the core infrastructure of the CTSF to harness Army and Joint expertise/resources. Through these federated resources, the CTSF executes or supports interoperability development, integration and certification testing of the systems and system of systems in the Warfighter Mission Area, to include Network Evaluation spinouts, as they become part of the Army's LandWarNet. The cited work is consistent with Strategic Planning Guidance and the Army Modernization and Strategy Plan.

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

	FY 2019	FY 2020	FY 2021
Title: Army Interoperability Certification (AIC) Testing	4.890	4.554	5.058
Description: Conduct Army Interoperability Certification (AIC), planning/coordination/scheduling/ and reporting of Common Operating Environment (COE) and software block testing (local and distributed). Provide stakeholders data collection/data analysis/data dissemination/simulation/stimulation verification/validation. Manage the set-up, configuration, integration, operations and maintenance of the LandWarNet/Mission Command (LWN/MC) systems within the CTSF test environments. Function as the CIO/G-6's Independent Test Agent for Program Managers of LWN/MC systems that have an Acquisition Life Cycle requirement for testing interoperability of software and associated hardware prior to fielding to the Warfighter. Act as the central control node to synchronize for the CIO/G6 accredited Federation of Net-centric Sites (FaNS) distributed AIC testing environment. Report the results of Army Interoperability Certification Tests to the CIO/G-6, PM, and TRADOC communities to support updates to the G-3/5/7 managed baseline.			
FY 2020 Plans: Continue SWB11-12, and COE v3 and beyond test planning, test case development, test environment architecture set-up, to include cyber security posture assessment and adjustment activities for the systems that comprise the Army's tactical baselines			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Conduct interoperability testing for the SWB11-12 systems that comprise the LWN/MC baseline to ensure the tactical integrated computing infrastructure is interoperable in a System of Systems (SoS) environment and to enable the CIO/G-6 to enforce a standards based architecture.</p> <p>FY 2021 Plans: Continue SWB11-12 test planning, test case development, test environment architecture set-up, for interoperability testing, Geospatial Information Systems (GIS) interoperability assessment, cyber security posture assessment and adjustment activities for the systems that comprise the Army's tactical baselines. Conduct interoperability testing for the SWB11-12 systems that comprise the LWN/MC baseline to ensure the tactical integrated computing infrastructure is interoperable in a System of Systems (SoS) environment and to enable the CIO G6 to enforce a standards based architecture. Mature the capability that assists CIO/ G-6 requirement to support ATEC and AFC by executing interoperability assessments of Cross-Functional Team (CFT) solutions. Execute discreet AIC test events (up to 6x/yr) and maintain an enduring discreet AIC test capability. Implement an AIC Secret Releasable test environment that integrates Army and the Mission Partner Environment and support testing with our FYES, ABCANZ, and G-3 Big Ten Coalition partners.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase support testing.</p>				
<p>Title: Engineering Services</p> <p>Description: Provide network engineering support to establish and maintain tactical architectures on the CTSF test floors and to deploying/fielded units at training centers around the world (JRTC, NTC, JMRC). System engineering support provides hardware virtualization, Army End Point Security System (AESS) support, system validation and integration support to numerous PMs on the integration and risk reduction labs, and assists Army programs with interoperability assessments and AIC rehearsal. Modify and merge army data products for CTSF test architectures. Develop/Maintain Applications for CTSF in-house programs.</p> <p>FY 2020 Plans: Maintain Network Baseline and Modernization in accordance with the Mission Command Network Modernization Implementation Plan to include Network support for integration and test floors, network support to fielded units, and systems engineering and analysis support to system of systems integration activities. Plan and conduct engineering evaluations for AIC testing and data collection in the Capability Integration Evaluation (CIE) to leverage the operational environment and CIE resources. Work with Network Cross Functional Team on Network modernization. Support AIC Integration and Testing. Continue Network Integration Checkout prior to each AIC. Continue support to PMs for tactical network availability of future COE insertions and integration. Provide CTSF network and systems engineering for validation of end-to-end sensor and platform communications and interoperability. Continue to modernize network equipment and capabilities, research wireless networks and tactical feasibility. Identify and incorporate software tools to monitor network performance and assist in issue resolution. Application Programmers</p>		0.156	0.094	0.162

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>continue to develop and modify Configuration Management Tool Suite version 3 (CMTS3) modules. Assist PMs with integrating systems into the CTSF tactical Network. Integrate and implement Army End Point Security System (AESS) technology, assist PMs in the development of AESS policies. Update CTSF Standard Operating Procedures (SOPs) for CTSF controls ensuring that all users, information systems, and networks that reside within the CTSF Test Floor Network have a strong cybersecurity posture and CTSF is in compliance for Risk Management Framework (RMF) accreditation and continuous monitoring. As part of the CTSF Information Assurance Vulnerability Management (IAVM) Plan, all Network and systems devices are updated with the latest Information Assurance Vulnerability Alerts (IAVA) and Security Technical Implementation Guides (STIGs) on a quarterly schedule. Support Army Warfighting Exercises and Combatant Commands with interoperability technical support as required.</p> <p>FY 2021 Plans: Provide Network support for integration and test floors, network support to fielded units, and systems engineering and analysis support to system of systems integration activities. Integrate and implement Army End Point Security System (AESS) technology, assist PMs in the development of AESS policies. Plan and conduct engineering evaluations for AIC testing and data collection in the Joint Warfighter Assessment (JWA)/Capability Integration Evaluation (CIE) to leverage the operational environment and JWA/CIE resources. Work with Network Cross Functional Team on Network modernization and Integrated Tactical Network (ITN) design and testing. Assist integration and test architecture development to include Program of Record (POR) and non-POR radio communications devices to provide PMs and Materiel Developers testing in realistic environments. Conduct radio Verification and Validation. Support Army Test and Evaluation Command (ATEC) and Army Futures Command interoperability assessments of Cross-Functional Team (CFT) solutions. Continue efforts to implement an AIC Secret Releasable test environment network that integrates Army and the Unified Action Partners (UAP).</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to inflation factor.</p>			
<p>Title: Configuration Management</p> <p>Description: As the CTSF Configuration Management Office, provide CM functional and physical configuration management and change management to the CTSF Army Interoperability Certification test floor environment. Additionally, as the Army Configuration Management Office (ACMO), establish and maintain oversight control of the Army Master Library for the Army Interoperability Certified Fielded Baseline (AICFB). Archive system software and data products, correlated with their associated documentation, for the Army LandWarNet Mission Command Baseline (ALWNMCB), a subset of the AICFB. Establish and maintain the configuration and change management to the AICFB and the ALWNMCB for Lifecycle Software Management (LCSM). Provide support to the Army Staff (ARSTAF), Materiel Developers (MATDEV), Project Managers (PM), and System Owners (SO) through the orderly management of product configuration information and product change management (ChM), which enables capability revisions, improved reliability and maintainability, extended life, and reduced cost. Maintain and improve the Configuration Management Tracking System version 3 (CMTSIII), the Army's authoritative database management system</p>	2.487	2.705	1.482

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>(DBMS) for configuration management (CM) of the systems comprising Coalition Interoperability Assurance and Validation (CIAV), and the Warfighter Mission and Business Mission Areas of the Army Information Technology (IT) portfolio. Assist the CIO/G6 in conducting accreditation inspections and training for Federation of Net-centric Sites (FaNS) locations.</p> <p>FY 2020 Plans: Provide CM functional and physical configuration management and change management to the CTSF Army Interoperability Certification test floor environment. Provide CM functional and physical configuration management and change management to the AICFB, to include archiving the required system software, data products and documentation, while correlating the relevant data within the CMTSIII DBMS for visibility to users Army wide. Provide baseline reconciliation to the four quarterly CIO/G6 AICFB reports, identifying to commanders and their G-3/G-6 staff the Army's AIC certified, Interoperability Capability and Limitations assessed, AIC waived, and AIC exempted system software that is authorized to connect to the Army's network. Assist the CIO/G6 in conducting accreditation inspections and training for Federation of Net-centric Sites (FaNS) locations.</p> <p>FY 2021 Plans: Provide CM functional and physical configuration management and change management to the CTSF Army Interoperability Certification test floor environment. Provide CM functional and physical configuration management and change management to the AICFB, to include archiving the required system software, data products and documentation, while correlating the relevant data within the CMTSIII DBMS for visibility to users Army wide. Provide baseline reconciliation to the four quarterly CIO/G6 AICFB reports, identifying to commanders and their G-3/G-6 staff the Army's AIC certified, Interoperability Capability and Limitations assessed, AIC waived, and AIC exempted system software that is authorized to connect to the Army's network. Assist the CIO/G6 in conducting accreditation inspections and training for Federation of Net-centric Sites (FaNS) locations.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease due to reduction in Configuration Management workload.</p>				
<p>Title: Management Operations/Program Office</p> <p>Description: Provide management operations consisting of planning, programming and executing funds; planning and programming for required personnel; planning, programming and executing contracts supporting AIC testing processes; identifying reimbursable tests and collecting/allocating appropriate funds; planning and programming logistics activities, managing/controlling/documenting physical assets and inventories; and perform oversight and coordination of physical security with hosting installation.</p> <p>FY 2020 Plans: Program and execute funding. Plan and program manpower, identify contracting requirements and develop strategy for implementation in conjunction with CECOM Acquisition Center. Track testing schedule, prepare/coordinate/track customer funding for AIC testing activities and infrastructure support. Continue to provide field support coordination for unit training and</p>		1.052	1.028	0.462

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>exercises upon request. Maintain existing infrastructure while continuing to develop coordinate planning/engineering activities associated with transition to permanent facility; continue to enhance physical security, access control, force protection, COOP and EAP activities and exercises. Continue inventory accountability programs and asset control.</p> <p>FY 2021 Plans: Program and execute funding. Plan and program manpower, identify contracting requirements and develop strategy for implementation in conjunction with CECOM Acquisition Center. Track testing schedule, prepare/coordinate/track customer funding for AIC testing activities and infrastructure support. Continue to provide field support coordination for unit training and exercises upon request. Maintain existing infrastructure while transitioning to permanent facility; continue to enhance physical security, access control, force protection, COOP and EAP activities and exercises. Continue inventory accountability programs and asset control.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease due to reduced EXORD mission workload.</p>			
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638</p>	-	0.256	-
Accomplishments/Planned Programs Subtotals	8.585	8.637	7.164

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

N/A

Remarks

D. Acquisition Strategy

Transition from executing a single test event at a time to multiple simultaneous test events using new universal mission threads, providing speed and efficiency to the test/acquisition timeline. Execute system of systems interoperability testing and certification through the use of Government and Systems Engineering and Technical Analysis (SETA) contract personnel experienced in product development and interoperability testing. Testing and certification occurs in a cyclical fashion, with an expectation of an annual Software Block/Capability Set test followed with cyclical multiple test events to ensure integrity of software baselines to the Warfighter. Engineering Services provides strategic integration of software into a system of systems/family of systems environment to support interoperability testing. Establish and

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) C29 / <i>Centralized Technical Support Facility (CTSF)</i>

maintain Configuration Management and version control of the Army's Interoperable Battle Command LandWarNet Baseline. Distributed testing capability uses local assets and leverages other federated test facilities to create synergy and realize efficiencies.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.256		-		-		-	0.000	0.256	-
Subtotal			-	-		0.256		-		-		-	0.000	0.256	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MITRE Corp	FFRDC	Engineering Services : Fort Hood, TX	17.178	-		-		-		-		-	0.000	17.178	-
In-House	Allot	Engineering Services : Fort Hood, TX	2.548	-		-		-		-		-	0.000	2.548	-
Subtotal			19.726	-		-		-		-		-	0.000	19.726	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CECOM Matrix	Allot	Program and Budget Analysis Support : Fort Hood, TX/ Aberdeen Proving Grounds, MD	4.482	0.741		0.713		0.142		-		0.142	0.000	6.078	-
In-House Support	Allot	Management Operations, Logistics Support : Fort Hood, TX	9.928	-		-		-		-		-	0.000	9.928	-
ISSA/Training/TDY	Allot	Site Support Activities : Fort Hood, TX	0.307	0.250		0.230		0.257		-		0.257	0.000	1.044	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software						Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)			

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Supplies	C/UCA	Management Operations, Logistics Support : Fort Hood, TX	1.434	0.061		0.020		0.063		-		0.063	0.000	1.578	-
Moving Costs	Allot	Management Operations, Logistics Support : Fort Hood, TX	-	-		0.001		0.001		-		0.001	0.000	0.002	-
Subtotal			16.151	1.052		0.964		0.463		-		0.463	0.000	18.630	N/A

Remarks
 Under "open-the-door" cost model, all In-house support efforts are included under Test & Evaluation.
 Moving Costs associated with transitioning to permanent facility beginning in FY18.

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			
CECOM R2 3G/ RS3	C/CPFF	Test, Configuration Management : Fort Hood, TX	11.181	3.473	Sep 2019	2.836	May 2020	3.730	Sep 2021	-		3.730	0.000	21.220	-
CECOM S3/ SB SITE SUPPORT SERVICES	C/CPFF	Facilities, Maintenance, Security : Fort Hood, TX	10.226	1.227	Sep 2019	1.218	Aug 2020	1.328	Sep 2021	-		1.328	0.000	13.999	-
ISSA	MIPR	Utilities & NEC Support : Fort Hood, TX	4.945	-		-		-		-		-	0.000	4.945	-
ARL Matrix	MIPR	Test : Fort Hood, TX	6.374	-		-		-		-		-	0.000	6.374	-
In-House Support	Allot	Test : Fort Hood, TX	7.416	2.827		3.357		1.557		-		1.557	0.000	15.157	-
Instrumentation	C/UCA	Test Equipment Infrastructure : Fort Hood, TX	3.185	0.006		0.006		0.086		-		0.086	0.000	3.283	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)
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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			
Subtotal			43.327	7.533		7.417		6.701		-		6.701	0.000	64.978	N/A

Remarks
 ARL Matrix effort became a "reimbursable" effort under Open-the-Door cost model effective in FY17; no longer "Direct" funded.
 ISSA no longer funded at CTSF level.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	79.204	8.585	8.637	7.164	-	7.164	0.000	103.590	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)

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
11-21 AIC Test event	■																											
19.1 Universal Test Environment AIC Test event			■		Transition to Universal Test Environment																							
19.2 Universal Test Environment AIC Test event				■																								
Baseline Updates 1st QTR FY20				■																								
20.1 Universal Test Environment AIC Test event						■																						
Baseline Updates 3rd QTR FY20							■																					
20.2 Universal Test Environment AIC Test event								■																				
Baseline Updates 1st QTR FY21											■																	
21.1 Universal Test Environment AIC Test event											■																	
Baseline Updates 3rd QTR FY21												■																
21.2 Universal Test Environment AIC Test event															■													
Baseline Updates 1st QTR FY22																■												
22.1 Universal Test Environment AIC Test event																			■	■								

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)

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
Baseline Updates 3rd QTR FY22																												
22.2 Universal Test Environment AIC Test event																												
Baseline Updates 1st QTR FY23																												
23.1 Universal Test Environment AIC Test event																												
Baseline Updates 3rd QTR FY23																												
23.2 Universal Test Environment AIC Test event																												
Baseline Updates 1st QTR FY24																												
24.1 Universal Test Environment AIC Test event																												
Baseline Updates 3rd QTR FY24																												
24.2 Universal Test Environment AIC Test event																												
Baseline Updates 1st QTR FY25																												
25.1 Universal Test Environment AIC Test event																												
Baseline Updates 3rd QTR FY25																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software		Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)	

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				
25.2 Universal Test Environment AIC Test event																																
Configuration Management (CM)																																
Configuration Management (CM)																																
Engineering Services (ES) Test and Integration																																
Engineering Services (ES) Test and Integration																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
11-21 AIC Test event	1	2019	1	2019
19.1 Universal Test Environment AIC Test event	2	2019	3	2019
19.2 Universal Test Environment AIC Test event	4	2019	4	2019
Baseline Updates 1st QTR FY20	4	2019	1	2020
20.1 Universal Test Environment AIC Test event	2	2020	2	2020
Baseline Updates 3rd QTR FY20	2	2020	3	2020
20.2 Universal Test Environment AIC Test event	4	2020	4	2020
Baseline Updates 1st QTR FY21	4	2020	1	2021
21.1 Universal Test Environment AIC Test event	2	2021	2	2021
Baseline Updates 3rd QTR FY21	2	2021	3	2021
21.2 Universal Test Environment AIC Test event	4	2021	4	2021
Baseline Updates 1st QTR FY22	4	2021	1	2022
22.1 Universal Test Environment AIC Test event	1	2022	2	2022
Baseline Updates 3rd QTR FY22	2	2022	3	2022
22.2 Universal Test Environment AIC Test event	3	2022	4	2022
Baseline Updates 1st QTR FY23	4	2022	1	2023
23.1 Universal Test Environment AIC Test event	1	2023	2	2023
Baseline Updates 3rd QTR FY23	2	2023	3	2023
23.2 Universal Test Environment AIC Test event	3	2023	4	2023
Baseline Updates 1st QTR FY24	4	2023	1	2024
24.1 Universal Test Environment AIC Test event	1	2024	2	2024
Baseline Updates 3rd QTR FY24	2	2024	3	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) C29 / <i>Centralized Technical Support Facility (CTSF)</i>

Events	Start		End	
	Quarter	Year	Quarter	Year
24.2 Universal Test Environment AIC Test event Baseline Updates 1st QTR FY25	3	2024	4	2024
25.1 Universal Test Environment AIC Test event Baseline Updates 3rd QTR FY25	1	2025	2	2025
25.2 Universal Test Environment AIC Test event Configuration Management (CM)	3	2025	4	2025
Engineering Services (ES) Test and Integration	1	2019	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) C34 / Army Tac C2 Sys Eng			
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
C34: Army Tac C2 Sys Eng	-	7.661	9.483	9.706	-	9.706	11.974	11.694	11.075	11.378	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project C34, Army TAC C2 Sys Eng, supports the Army's Network Modernization Strategy LOE 1, Unified Network. Project C34 coordinates technical efforts across and outside of PEO C3T to ensure integration with the current and future Mission Command Network. Project C34 provides technical support for programs aligned and in support of LOEs 1 through 4 that informs the design and solutions with specific emphasis on the ability for the different efforts to be integrated and interoperable with one another. Efforts support the Network CFT capability set strategy.

Project C34, Army Tactical Command and Control Systems Engineering: This project funds the PEO Command, Control, Communications-Tactical (PEO C3T) System of Systems engineering and integration, experimentation, acquisition management, testing, fielding and sustainment support to ensure interoperability and affordability within the PEO C3T portfolio. The effort focuses on System-of-Systems (SoS) Engineering and Integration for the Mission Command Network with increased emphasis on immediate Warfighter needs as well as leveraging emerging technologies.

Fiscal Year 2021 will focus on the continued development, implementation and integration of the Command, Control, Communications, Computers, Combat Systems, Intelligence, Surveillance, and Reconnaissance (C5ISR) network architectures. This includes maturing the technology enhancement roadmap for SoS capability evolution across the PEO C3T portfolio that incorporates Cross Functional Team initiatives; network integration support and design products for system validation through various N-CFT lead experimentation and integration testing; integration of tactical networked capabilities for all Mission Command Network systems and integration events; integration of tactical information assurance solutions and security measures for consistent cyber protection; and support to N-CFT evaluations.

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

	FY 2019	FY 2020	FY 2021
Title: Mission Command Network Synchronization and Integration Support	0.118	0.084	0.150
Description: Funds are for the following effort:			
FY 2020 Plans:			
Continue the support of current force and the development of future force C5ISR across the tactical network to ensure all Assistant Secretary of the Army (Acquisition, Logistics & Technology) (ASA(ALT)) programs are synchronized and redundancies and overlapping capabilities are reduced across the network and in synchronization with Common Operating Environment.			
FY 2021 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Continue the support of current force and the development of future force C5ISR across the tactical network to ensure all Assistant Secretary of the Army (Acquisition, Logistics & Technology) (ASA(ALT)) programs are synchronized and redundancies and overlapping capabilities are reduced across the network and in synchronization with Common Operating Environment. FY 2020 to FY 2021 Increase/Decrease Statement: Increase supports continued network synchronization				
Title: Developmental Test and Integration Test Support between Programs of Record (PORs) and platforms / Command Posts (CPs) to execute System-of-Systems (SoS) and Interoperability Description: Funds support the following effort: FY 2020 Plans: Continue to mature/revise the design, configuration and establishment of the system of systems integration test infrastructure architecture and implementation. Continue to provide the infrastructure and support in conducting integration testing and systems engineering for C3T non-program of record and program of record systems, products, technical insertions, and systems under evaluation to ensure integration of capabilities across the network. Maintain support of COE risk reduction testing. Continue the design and coordination of integration testing across the Mission Command Network systems. FY 2021 Plans: Continue to mature/revise the design, configuration and establishment of the system of systems integration test infrastructure architecture and implementation. Continue to provide the infrastructure and support in conducting integration testing and systems engineering for C3T non-program of record and program of record systems, products, technical insertions, and systems under evaluation to ensure integration of capabilities across the network. Maintain support of COE risk reduction testing. Continue the design and coordination of integration testing across the Mission Command Network systems. FY 2020 to FY 2021 Increase/Decrease Statement: Increase supports continued development.		1.147	1.357	1.453
Title: Tactical Network Engineering Description: Funds support the following efforts: FY 2020 Plans: Develop effective engineering strategies to integrate tactical applications for use across the C3T enterprise network. Continue to perform network planning and integration activities across all cross-domain system-of-systems future capabilities and technologies. FY 2021 Plans:		0.657	0.752	0.834

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Develop effective engineering strategies to integrate tactical applications for use across the C3T enterprise network. Continue to perform network planning and integration activities across all cross-domain system-of-systems future capabilities and technologies. FY 2020 to FY 2021 Increase/Decrease Statement: Increase supports continued engineering.				
Title: Conduct and Support System Interoperability Engineering and Development of System-of-Systems (SoS) Architectural Products Description: Funds support the following efforts: FY 2020 Plans: Within the PEO C3T portfolio and in conjunction with N-CFT activities, continue to assess Emerging Technologies, identify critical integrated test points, monitor developmental testing at integration points, develop architectural data processes and products, and facilitate the transition of Network capabilities to the warfighter. FY 2021 Plans: Within the PEO C3T portfolio and in conjunction with N-CFT activities, continue to assess Emerging Technologies, identify critical integrated test points, monitor developmental testing at integration points, develop architectural data processes and products, and facilitate the transition of Network capabilities to the warfighter. FY 2020 to FY 2021 Increase/Decrease Statement: Increase supports continued development efforts.		1.476	1.766	1.872
Title: Development and Implementation of Tactical Information Assurance (IA) Description: Funds support the following efforts: FY 2020 Plans: Continue to implement ARCYBER, CIO/G6 and CYBERCOM guidance for execution of Information Assurance policies and procedures at the tactical level. Continue to document the current tactical IA network architecture with the goal of developing recommendations to eliminate inconsistencies/duplications, increasing the security posture, decreasing complexity of operations, and decreasing costs. Continue to plan and design security measures and IA requirements across the tactical network for future capabilities. FY 2021 Plans: Will continue to implement ARCYBER, CIO/G6 and CYBERCOM guidance for execution of Information Assurance policies and procedures at the tactical level. Continue to document the current tactical IA network architecture with the goal of developing		0.223	0.214	0.283

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>recommendations to eliminate inconsistencies/duplications, increasing the security posture, decreasing complexity of operations, and decreasing costs. Continue to plan and design security measures and IA requirements across the tactical network for future capabilities.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase supports continuing development efforts.</p>				
<p>Title: System of Systems Development</p> <p>Description: Funds support the following efforts:</p> <p>FY 2020 Plans: Continue to effectively manage overall System-of-Systems Engineering, Enterprise, and Integration efforts for the PEO C3T portfolio of technology and capability enhancement programs. Continue to conduct SoS engineering design for capabilities planned to field in FY 2020, FY 2021 and FY 2022 to include Program of Record and emerging LOE technologies.</p> <p>FY 2021 Plans: Continue to effectively manage overall System-of-Systems Engineering, Enterprise, and Integration efforts for the PEO C3T portfolio of technology and capability enhancement programs. Continue to conduct SoS engineering design for capabilities planned to field in FY 2021, FY 2022 and FY 2023 to include Program of Record and emerging LOE technologies.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase supports continued system of system development.</p>		2.628	3.193	3.324
<p>Title: System of Systems (SoS) Engineering and Integration Evolution of the Network</p> <p>Description: Funds support the following efforts:</p> <p>FY 2020 Plans: In Conjunction with LOE and CFT efforts, continue to implement cross PEO System of Systems Engineering and Integration processes, analysis and S&T coordination to ensure successful development Engineering and Testing of current and future systems. Continue to develop streamlined processes to support ASA(ALT) OCE and implement Value Engineering (VE) and Lean Six Sigma initiatives across all PEO C3T capabilities to include the Mission partner Environment.</p> <p>FY 2021 Plans: In Conjunction with LOE and CFT efforts, continue to implement cross PEO System of Systems Engineering and Integration processes, analysis and S&T coordination to ensure successful development Engineering and Testing of current and future</p>		1.412	1.686	1.790

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
systems. Continue to develop streamlined processes to support ASA(ALT) OCE and implement Value Engineering (VE) and Lean Six Sigma initiatives across all PEO C3T capabilities to include the Mission Partner Environment.				
FY 2020 to FY 2021 Increase/Decrease Statement: Increase supports continuing system of system integration efforts.				
Title: FY 2020 SBIR/STTR Transfer		-	0.431	-
Description: Funding transferred in accordance with Title 15 USC ?638				
FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638				
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638				
Accomplishments/Planned Programs Subtotals		7.661	9.483	9.706
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
Not applicable for this item.				
D. Acquisition Strategy				
This project provides the technical and programmatic disciplines required for systems engineering and integration, experimentation, acquisition management, testing, interoperability, support to fielding and sustainment. It will focus on System-of-Systems (SoS) Systems Engineering and Integration for the tactical network with increased emphasis on immediate Warfighter needs as well as leveraging emerging technologies. Efforts align to support the acquisition strategies of the programs that must connect to the network.				

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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 / 5				PE 0604818A / Army Tactical Command & Control Hardware & Software				C34 / Army Tac C2 Sys Eng							
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	-	-		0.431		-		-		-	0.000	0.431	-
Subtotal			-	-		0.431		-		-		-	0.000	0.431	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
System of System Engineering & Integration, Current & Strategic Initiative, Architecture Integration	C/CPFF	Bowhead : APG MD	-	2.750	Nov 2018	3.850	Dec 2019	4.055	Nov 2020	-		4.055	Continuing	Continuing	Continuing
Systems Engineering Support	Various	Various : APG, MD	3.746	0.322	Oct 2018	0.692	Oct 2019	0.820	Oct 2020	-		0.820	Continuing	Continuing	Continuing
System of System Architectures, Engineering, and Integration	SS/FP	MITRE : Aberdeen Proving Ground, MD/ Eatontown, NJ	98.992	4.089	Oct 2018	4.148	Sep 2020	4.349	Oct 2020	-		4.349	Continuing	Continuing	Continuing
Subtotal			102.738	7.161		8.690		9.224		-		9.224	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
MATRIX	MIPR	CERDEC : Aberdeen Proving Ground, MD	13.602	0.500		0.362		0.482		-		0.482	Continuing	Continuing	Continuing
Subtotal			13.602	0.500		0.362		0.482		-		0.482	Continuing	Continuing	N/A
Project Cost Totals			116.340	7.661		9.483		9.706		-		9.706	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng

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
Mission Command Network S&T					[Blue Bar]																							
S&T Synchronization: Oversee PM Transition Status									Oversee PM Transition Status																			
S&T Synchronization: Develop S&T Gaps & Review									Develop S&T Gaps & Review																			
S&T Synchronization: Develop PM Plans / POM Initiatives									Develop PM Plans / POM Initiatives																			
S&T Synchronization- Oversee PM Transition Status													Oversee PM Transition Status															
S&T Synchronization Develop S&T Gaps & Review													Develop S&T Gaps & Review															
S&T Synchronization- Develop PM Plans / POM Initiatives													Develop PM Plans / POM Initiatives															
Analysis Network Analysis									Network Analysis																			
System of Systems System Engineer, Integration, and Development																												
System of System Solutions Year 1									[Blue Bar]																			
SoS PDR					1 PDR																							
SoS CDR					2 CDR																							
System of Systems Solutions Year 2									[Blue Bar]																			

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng

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				
SoS PDR									3 PDR																							
SoS CDR									4 CDR																							
System of Systems Solutions Year 3																																
SoS PDR																					5 PDR											
SoS CDR																					6 CDR											
System of System Integration Risk Reduction																																
Integration Test Support SoS RR																																
Integration Test Support SoS RR																																
Integration Test Support SoS RR																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Mission Command Network S&T	1	2020	4	2021
S&T Synchronization: Oversee PM Transition Status	1	2020	4	2020
S&T Synchronization: Develop S&T Gaps & Review	2	2020	3	2020
S&T Synchronization: Develop PM Plans / POM Initiatives	3	2020	4	2020
S&T Synchronization- Oversee PM Transition Status	1	2021	4	2021
S&T Synchronization Develop S&T Gaps & Review	2	2021	3	2021
S&T Synchronization- Develop PM Plans / POM Initiatives	3	2021	4	2021
Analysis Network Analysis	1	2020	4	2021
System of Systems System Engineer, Integration, and Development	1	2020	4	2025
System of System Solutions Year 1	1	2020	1	2021
SoS PDR	2	2020	2	2020
SoS CDR	4	2020	4	2020
System of Systems Solutions Year 2	1	2021	1	2022
SoS PDR	2	2021	2	2021
SoS CDR	4	2021	4	2021
System of Systems Solutions Year 3	1	2022	1	2023
SoS PDR	2	2022	2	2022
SoS CDR	4	2022	4	2022
System of System Integration Risk Reduction	1	2020	4	2021
Integration Test Support SoS RR	1	2020	1	2020
Integration Test Support SoS RR	3	2020	4	2020
Integration Test Support SoS RR	3	2021	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)			
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
EJ4: COMMAND POST COMPUTING ENVIRONMENT (CPCE)	-	33.693	30.969	27.489	-	27.489	27.470	27.406	27.403	27.515	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line is directly aligned to the Army Network Modernization Strategy LOE 2, Common Operating Environment (COE). Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

The Common Operating Environment (COE) is an approved set of computing technologies and standards that enables secure and interoperable applications to be developed and executed rapidly across a variety of computing environments (i.e., server(s), client, mobile, sensors, and platform). The Command Post Computing Environment (CPCE) is one of the six computing environments under the COE, which provides the movement and maneuver applications, common computing services such as Cyber tools and e-mail, and includes tactical server capabilities within Command Posts at all echelons (Battalion to Army Service Component Commander).

To mitigate potential misalignments with the requirements community, the program increment designations will align with validated requirement documents. Accordingly, the former Increment 2 is now designated as Increment 1 to align with Capability Drop 1. Increment 1, which was approved via Full Deployment Decision in July 2019 and currently fielded, is now designated Increment 0. CPCE Increment 0 requirements are detailed in the Minimum Essential Capabilities document.

The CPCE implements an integrated, interoperable, cyber-secure, cost-effective software infrastructure that serves as the host for a unified set of multiple warfighting functional applications within the command post. This software infrastructure will be central to the COE, allowing interoperability between command posts, mounted platforms, and dismounted handheld devices while supporting collaboration using a common picture with Joint and Unified Action partners. CPCE will provide a core software infrastructure including a common operating picture (COP) tool, common look and feel (user interface), common data strategy, interoperable tactical messaging/chat, and essential movement and maneuver capabilities. CPCE software infrastructure and applications will reside on Tactical Server Infrastructure (TSI) hardware and previously fielded BCCS/TSI servers. The CPCE eliminates "stove-piped" legacy systems, duplicative or redundant implementations, simplifies future application development efforts, and enhances interoperability and data sharing across multiple echelons.

CPCE employs an agile development approach, in two year increments, with capabilities being integrated to support the Army IS COE effort. Increment 0 includes core infrastructure and initial movement and maneuver capabilities. Increment 1 of the program will meet the requirements of the CPCE Requirements Definition Package and Capability Drop 1, and bring enhancements to Increment 0 and initial system convergence. Increment 2 will bring additional warfighting function capabilities and enhancements to existing capability.

FY 2021 funding will support the consolidation, adjudication, and codification of specific technical requirements for CPCE Increment 1 with focus on the support of legacy system infrastructure requirements and begin requirements planning and design phase of CPCE Increment 2. These efforts will extend the capabilities of the Increment

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)		
0 baseline to include infrastructure modification/improvement to facilitate convergence of legacy Mission Command system capabilities, CPCE Capability Drop 1 (CD1) requirements, Cross-Cutting Capabilities (CCC) enhancements and additional Movement and Maneuver capabilities.				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Title: SW Dev - Core Infrastructure		23.021	20.078	16.477
<p>Description: Provides a core software infrastructure that underpins an integrated mission command capability in command posts, from ASCC to Battalion echelons that provides simplicity, intuitiveness, core services and applications, common look and feel, and warfighter functionality in the areas of Fires, Logistics, Intelligence, Airspace Management and Maneuver. Primary software development efforts include development of a simple Common Operating Picture (COP), a Common Geospatial solution (map), a user interface with "common look and feel", common Data Services including an extensible database and data persistence, tactical messaging and translation, and backwards compatibility to previously fielded legacy systems. Software development efforts focus on designing the system to reduce the training burden on the Soldier, and the creation of an Integrated Software Development Kit (ISDK) that allows external developers the ability to integrate new capabilities without rebuilding common components.</p> <p>FY 2020 Plans: Continue to incorporate new capabilities into the CPCE infrastructure, both COTS and Government-developed. Development and integration of new capabilities and features including additional movement and maneuver functions, engineer functions, and mission planning functions including Map-based Planning Services (MBPS), Joint Planning Services (JPS), and direct data ingest from other warfighting systems.</p> <p>This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.</p> <p>FY 2021 Plans: Continue to facilitate legacy system capability convergence, incorporate new Commercial off the shelf (COTS) and Government-developed capabilities into the CPCE infrastructure. Development and integration of new capabilities and features including additional movement and maneuver functions, engineer functions, Infrastructure modification/improvement to support legacy system capability convergence, CPCE Capability Drop 1 (CD1) requirements, Cross-Cutting Capabilities (CCC) enhancements and enhancements for Movement and Maneuver.</p> <p>This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease due to reduced requirements for infrastructure software as the product matures.</p>				
Title: Hardware/Software Integration		3.883	2.713	2.823

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Description: Hardware / Software Integration within CPCE consists of research, development, and engineering efforts required to select, engineer, and field a COTS hardware server and related components. The CPCE software resides on converged Tactical Server Infrastructure (TSI) server stacks, which host multiple software infrastructure components including Microsoft Exchange, SharePoint, Defensive Cyber Operations (DCO) tools, SQL databases, Active Directory, and others. This enterprise software is tightly-coupled with, and engineered for, specific TSI hardware using virtual machine (VM) technology and must serve as the basis for all other warfighting functions and mission command system software loaded on the server.</p> <p>FY 2020 Plans: For FY 2020, efforts will focus on new design requirements for the TSI server architecture to achieve further savings in size, weight, and power. Engineering efforts will continue to refine the automated server provisioning and configuration tool that will allow rapid provisioning of new software capabilities and remote system querying and patching. Additional engineering effort will be required to ensure DCO tools are integrated and unique hardware requirements are accounted for.</p> <p>This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.</p> <p>FY 2021 Plans: For FY 2021, efforts will continue to focus on design enhancements for the TSI server architecture to achieve further savings in size, weight, and power. Engineering efforts will continue to refine the automated server provisioning and configuration tool that will allow rapid provisioning of new software capabilities and remote system querying and patching. Additional engineering effort will be required to ensure DCO tools are integrated and unique hardware requirements are accounted for. Engineering of Cyber Situational Understanding (SU) integration will begin.</p> <p>This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease aligns with maturation of integration process and planned requirements for CPCE/TSI server architecture enhancements.</p>				
Title: Test and Evaluation		1.541	4.228	5.691
<p>Description: Test and evaluation efforts include the planning and conduct of Command Post Computing Environment (CPCE) / Mounted Computing Environment (MCE) T&E events including Developmental Test (DT), System Software Acceptance Testing (SSAT), Integration Events, Risk Reduction Events, Initial Operational Test and Evaluation (IOT&E), and Follow-on Test and Evaluation (FOT&E).</p> <p>FY 2020 Plans:</p>				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>In FY 2020, CPCE will conduct multiple developmental tests, experiments, and user juries as new software capabilities and features are developed. CPCE software will also participate in Army Interoperability Certification (AIC) testing, Joint Warfighter Assessments, and Army Warfighter Exercises (Wfx), requiring technical system support.</p> <p>This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.</p> <p>FY 2021 Plans: In FY 2021, CPCE will conduct multiple developmental tests to support CPCE Increment 1 capabilities and features. CPCE software will also participate in Army Interoperability Certification (AIC) testing, and a formal Operational Assessment to inform an Increment 1 fielding decision. This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase required to support continued testing to accommodate convergence of legacy Mission Command Systems, and the formal Increment 1 Operational Assessment.</p>				
<p>Title: Program Management</p> <p>Description: Program management includes overall management of program. Includes participation in program planning meetings and IPTs.</p> <p>FY 2020 Plans: Program office management in the areas of Business, Technical, and Logistics remains a requirement in FY 2020. This support includes personnel covered by Functional Support Agreements between PM Mission Command and various Government support agencies such as the Army Research and Development Center (ARDEC) CECOM Research Development and Engineering Command (CERDEC), and other PEOs (e.g. PEO IEW&S). Program Management efforts in the FY 2020 timeframe will also include business area support to ensure funding and contracts are planned and available for all SW development, system engineering, and DT efforts.</p> <p>This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.</p> <p>FY 2021 Plans: Program office management in the areas of Technical, and Logistics remains a requirement in FY 2021. This support includes personnel covered by Functional Support Agreements between PM Mission Command and various Government support agencies such as the Army Research and Development Center (ARDEC), and Combat Capabilities Development Command (CCDC). Program Management efforts in the FY 2021 timeframe will also include management of all SW development, system engineering, exercise support, DT and Operational Assessment efforts.</p>		5.248	2.543	2.498

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
This effort's funding will be executed by Program Executive Office for Command, Control and Communications-Tactical. FY 2020 to FY 2021 Increase/Decrease Statement: Decrease aligns with manpower requirements for management of CPCE program.			
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC 7638	-	1.407	-
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 7638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 7638			
Accomplishments/Planned Programs Subtotals	33.693	30.969	27.489

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>
• B70000: COE Tactical Server Infrastructure (TSI)	20.500	67.533	94.871	-	94.871	94.052	106.057	110.504	110.702	Continuing	Continuing

Remarks
Related to CPCE is the Tactical Server Infrastructure (TSI) funding line, B70000, which funds computer hardware and software servers/hosting platforms for CPCE software.

D. Acquisition Strategy
CPCE is an ACAT II hardware and software Defense Acquisition Program, structured in 2-year Increments (Inc). In accordance with DoD direction that procurement and modification of Commercial Off-the-Shelf (COTS) products is the preferred acquisition approach, CPCE procured a COTS battle management system to serve as the underlying core infrastructure, and is modifying that COTS product to meet additional Army requirements, including backwards compatibility with legacy systems. For development of additional capabilities to be integrated into the COTS system, CPCE follows the Agile development approach (Epics, Iterations, and Sprints) that allows capabilities to be engineered, developed and tested rapidly. The Combat Capabilities Development Command (CCDC) Armaments Center Weapons and Software Engineering Center (WSEC) and the Communications-Electronics Command (CECOM) Software Engineering Center (SEC) are prime Government partners in system development. Commercial suppliers are assigned efforts through GSA Mission Command Engineering Services vehicles and Multiple Award Task Order (MATO) contracts.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) EJ4 / <i>COMMAND POST COMPUTING ENVIRONMENT (CPCE)</i>
<p>Hardware (server) platforms are COTS and procured under the Tactical Services Infrastructure (TSI) funding line through existing vehicles from GSA, Common Hardware Systems (CHS) and the Army Computer Hardware Enterprise Software and Solutions (CHESS).</p> <p>CPCE Inc 0 brings the core software infrastructure and initial movement and maneuver capabilities. Inc 1 will meet the requirements of the CPCE Requirements Definition Package and Capability Drop 1, and focuses on enhancements to Inc 0, and enabling legacy system convergence. Inc 2 will bring additional warfighting function capabilities and enhancements to existing capability.</p> <p>The Milestone Decision Authority (MDA) approved the TSI Acquisition Strategy on 17 May 2019 and issued an Acquisition Decision Memorandum (ADM) approving a Full Deployment Decision (FDD) to field CPCE Increment 0 capability on the TSI. CPCE Inc 0 underwent Initial Operational Test & Evaluation in Nov 2018 and conditional authority to field the capability was granted on 15 Jul 19. The CPCE Inc 1 Milestone B Acquisition Decision Memorandum was signed on 9 Sep 2019 authorizing entry into the Engineering and Manufacturing Development (EMD) Phase of the acquisition lifecycle.</p>		

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PM Support (Gov't-Core)	Sub Allot	PM Mission Command : APG, MD	5.603	-		-		-		-		-	0.000	5.603	-
PM Support (Gov't-Matrix)	IA	Various Matrix Orgs incl CECOM SEC, LRC, PRD, et al) : APG, MD	5.747	-		-		-		-		-	0.000	5.747	-
PM Support (SETA Contractor)	C/FFP	Multiple incl CSRA and others : APG, MD	12.853	5.248	Nov 2018	2.543	Nov 2019	2.498	Nov 2020	-		2.498	0.000	23.142	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.407		-		-		-	0.000	1.407	-
Subtotal			24.203	5.248		3.950		2.498		-		2.498	0.000	35.899	N/A

Remarks
Funding for Core government support (Management and Oversight of CPCE) transitions to OMA Appropriation in FY19.

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
System Requirements Engineering	Various	SW Dev Contractors and Multiple Matrix Orgs : Various Locations	23.831	-		-		-		-		-	0.000	23.831	-
Software Development - Core Infrastructure	Option/ Various	ARDEC, CCDC, Systematic : Picatinny, NJ APG, MD Centerville, VA	132.441	23.021	Oct 2018	20.078	Oct 2019	16.477	Oct 2020	-		16.477	0.000	192.017	-
Joint and Coalition Interoperability	Various	Multiple : Various	0.296	-		-		-		-		-	0.000	0.296	-
Hardware / Software Integration	IA	Various Matrix Orgs incl CECOM SEC,	19.201	3.883	Oct 2018	2.713	Oct 2019	2.823	Oct 2020	-		2.823	0.000	28.620	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
		ARDEC, LRC, PRD, et al) : APG Md													
Subtotal			175.769	26.904		22.791		19.300		-		19.300	0.000	244.764	N/A

Remarks
Software Development efforts will be managed through a combination of COTS Procurement, PM Mission Command technical staff, Matrix Organizations (CERDEC, AMRDEC) and software development contractor firms (contracts and task orders to be determined and competed as necessary).

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Support	C/FFP	SSCI : Austin, TX	2.989	-		-		-		-		-	0.000	2.989	-
Subtotal			2.989	-		-		-		-		-	0.000	2.989	N/A

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			
Develop and Conduct Tests and Assessments	MIPR	Multiple Test Agencies : Multiple Locations (Primary APG)	14.353	1.541	Oct 2018	4.228	Oct 2019	5.691	Oct 2020	-		5.691	0.000	25.813	-
Subtotal			14.353	1.541		4.228		5.691		-		5.691	0.000	25.813	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
Project Cost Totals			217.314	33.693	30.969	27.489	-	27.489	0.000	309.465	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)

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 Program of Record Functionality	[Redacted]																											
CPCE PoR Test & Integration	[Redacted]																											
Developmental Test Increment 0	[Redacted]																											
CPCE Increment 0 OT	[Redacted]																											
JWA 19.1	[Redacted]																											
Fielding Decision Increment 0	[Redacted]																											
First Unit Equipped V3.0	[Redacted]																											
CPCE Increment 1 Design	[Redacted]																											
CPCE Increment 1 Milestone B	[Redacted]																											
CPCE Increment 1 Development & Integration	[Redacted]																											
Developmental Test Increment 1	[Redacted]																											
JWA 20	[Redacted]																											
CPCE Increment 1 Operational Assessment	[Redacted]																											

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)

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												
Fielding Decision Increment 1													4 Fielding Decision																											
CPCE Increment 2 Design													Increment 2 Design																											
CPCE Increment 2 Development & Integration													Increment 2 Development and Integration																											
Developmental Test Increment 2													Increment 2 Developmental Test																											
CPCE Increment 2 Operational Assessment													Increment 2 Operational Assessment																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Integrate Program of Record Functionality	2	2019	4	2025
CPCE PoR Test & Integration	1	2018	4	2025
JWA 18.1	1	2018	1	2018
Developmental Test Increment 0	4	2018	1	2019
CPCE Increment 0 OT	1	2019	1	2019
JWA 19.1	1	2019	1	2019
Fielding Decision Increment 0	4	2019	4	2019
First Unit Equipped V3.0	4	2019	4	2019
CPCE Increment 1 Design	3	2019	2	2020
CPCE Increment 1 Milestone B	4	2019	4	2019
CPCE Increment 1 Development & Integration	2	2020	4	2021
Developmental Test Increment 1	3	2020	3	2021
JWA 20	3	2020	3	2020
CPCE Increment 1 Operational Assessment	3	2021	4	2021
Fielding Decision Increment 1	4	2021	4	2021
CPCE Increment 2 Design	4	2021	3	2022
CPCE Increment 2 Development & Integration	2	2022	4	2023
Developmental Test Increment 2	3	2022	3	2023
CPCE Increment 2 Operational Assessment	3	2023	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)			
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
EJ5: MOUNTED COMPUTING ENVIRONMENT (MCE)	-	18.463	10.464	18.582	-	18.582	22.145	20.091	17.571	17.887	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line is directly aligned to the Army Network Modernization Strategy LOE 2, Common Operating Environment. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

The Common Operating Environment (COE) is an approved set of computing technologies and standards that enables secure and interoperable applications to be developed and executed rapidly across a variety of computing environments (i.e., server(s), client, mobile, sensors, and platform). The Mounted Computing Environment (MCE) is one of six computing environments under the COE, which provides standardization of end-user environments and enables streamlined deployment of new war-fighting applications while leveraging existing hardware under the Joint Battle Command-Platform (JBC-P) program.

The MCE supports LOE 2 by utilizing:

- Interoperable data, message, and waveforms
- Sensors and applications that enable operations across domains
- Integration with Joint C5ISR and strike capabilities
- Increased interoperability with the Command Post Computing Environment and Mobile Handheld Computing Environment

Requirements for the MCE are established in the Army Requirements Oversight Council (AROC)-approved COE Information Systems Initial Capability Document (IS ICD) and the Mounted Computing Environment Requirements Definition Package (RDP).

MCE's Materiel Development Decision (MDD) is scheduled for 2QFY20.

MCE employs a Developmental Operations (DevOps) process to incrementally develop capability over time to satisfy requirements and meet fielding decisions. FY 2021 funding will continue DevOps activities to incorporate new capability and enhancements based on user feedback, as well as lay the groundwork to support migration of third-party applications onto the MCE software baseline. Additionally, FY 2021 funding provides for initial test instrumentation and risk reduction events/preparation to support a v3.1 Operational Test (OT) and Army Interoperability Certification (AIC) scheduled for 1QFY22.

MCE's RDT&E resources are used to improve and add software applications while JBC-P RDT&E is used to improve JBC-P hardware, network performance and add network resiliency.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Title: Software Development</p> <p>Description: Provides an integrated mission command capability across Platforms, through all echelons, that provides simplicity, intuitiveness, core services and applications, common look and feel, and warfighter functionality in the areas of Fires, Logistics, Intelligence, and Maneuver. Primary software development efforts include development of S/A functions and MC applications on a Common Geospatial solution [map], a user interface with "common look and feel", and common Data Services.</p> <p>FY 2020 Plans: Continues to incorporate new capabilities into the MCE infrastructure, core utilities, backwards compatibility, and Warfighter Function (WFF) applications into a holistic system of systems while ensuring that those subsystems function together in accordance with program requirements and specifications.</p> <p>Develops/integrates MCE v3.1 to include development of: 3rd Party Apps, initial logistical capabilities, Over-the-Air (OTA) updates for software patches, Information Assurance (IA), and maps, message standards migration, path diversity for Commercial Solutions for Classified (CSfC), Wi-Fi, and Iridium satellite communications, automated Primary Alternate Contingency Emergency (PACE), Assured-Position/Navigation/Timing (A-PNT) anti-jam and spoofing resilient Global Positioning System (GPS), and route planning/navigation.</p> <p>FY 2021 Plans: Continues to incorporate new capabilities into the MCE infrastructure, core utilities, backwards compatibility, and Warfighter Function (WFF) applications into a holistic system of systems while ensuring that those subsystems function together in accordance with program requirements and specifications.</p> <p>Continues to develop/integrate MCE v3.1 to include development of: 3rd Party Apps, initial logistical capabilities, Over-the-Air (OTA) updates for software patches, Information Assurance (IA), and maps, message standards migration, path diversity for Commercial Solutions for Classified (CSfC), Wi-Fi, and Iridium satellite communications, automated Primary Alternate Contingency Emergency (PACE), Assured-Position/Navigation/Timing (A-PNT) anti-jam and spoofing resilient Global Positioning System (GPS), and route planning/navigation.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase based on incorporation of new capabilities to support additional networks, additional cross-CE interfaces and create new software implementations.</p>		12.632	8.045	13.758
<p>Title: Software/Systems Engineering</p> <p>Description: Perform Software/Systems Engineering in support of the development of MCE capabilities, applications, and services, to include, but not limited to, conducting engineering studies, software architecture development, system analyses,</p>		1.728	0.382	0.851

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>technical readiness assessments, technical interchange meetings/events, and development of related reports and other deliverables. Coordinate the development of common infrastructure components with the CPCE and M/HHCE to define and incorporate the COE cross-cutting capabilities.</p> <p>FY 2020 Plans: In FY 2020, MCE will continue software maturity, integration of 3rd party Program of Record (PoR) applications onto the baseline software architecture, and platform integration onto the Army's wheeled platforms. MCE will also conduct experimentation with Army units in order to receive direct feedback from users of the MCE software. This feedback and unit experimentation will help shape the future software releases of MCE software to the Army.</p> <p>FY 2021 Plans: In FY 2021, MCE will continue systems engineering at a reduced level, integration of 3rd party Program of Record (PoR) applications onto the baseline software architecture, and platform integration onto the Army's wheeled platforms. MCE will also conduct experimentation with Army units in order to receive direct feedback from users of the MCE software. This feedback and unit experimentation will help shape the future software releases of MCE software to the Army.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Systems engineering increases due to integration of the Command of Robotic Systems (CoRS) S&T transition to MCE.</p>				
<p>Title: Test and Evaluation</p> <p>Description: Test and evaluation efforts include the planning and conduct of combined Command Post/Mounted Computing Environment T&E events including Developmental Test, Software Acceptance Testing, Integration Events, Risk Reduction Events, and Initial Operational Test and Evaluation (IOT&E).</p> <p>FY 2020 Plans: In FY 2020, MCE will continue to utilize DevOps to improve the current MCE software baseline as existing and future 3rd party Programs of Record (PoR) developed applications are migrated onto the common MCE software baseline.</p> <p>FY 2021 Plans: In FY 2021, MCE will continue to utilize DevOps to improve the current MCE software baseline as existing and future 3rd party Programs of Record (PoR) developed applications are migrated onto the common MCE software baseline. MCE will fund initial test instrumentation and risk reduction events/preparation to support a v3.1 Operational Test (OT) and Army Interoperability Certification (AIC) scheduled for 1QFY22</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>		2.879	0.653	2.512

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Test and Evaluation funding increased due to funding needed for initial test instrumentation and risk reduction events/preparation to support a v3.1 Operational Test (OT) and Army Interoperability Certification (AIC) scheduled for 1QFY22.				
<p>Title: PM Support (Matrix & Contractor)</p> <p>Description: Program management includes overall management of program execution, major events, reporting, and logistical support. Includes participation in program planning meetings and Integrated Project Teams.</p> <p>FY 2020 Plans: Technical area contract support will include system development and engineering changes to MCE's software, system analysis of Program of Record (PoR) systems and future systems, technical readiness assessments, and stakeholder technical interchange meetings/events. This support includes the creation and implementation of Functional Support Agreements (FSAs) between PM Mission Command and various Government support agencies such as the Combat Capabilities Development Command (CCDC) C5ISR (Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance) Center, and other PEOs (e.g. PEO GCS). Program Management efforts in the FY 2020 timeframe will also include business area support to ensure funding and contracts are planned and available for all SW development, system engineering, and DT efforts.</p> <p>FY 2021 Plans: Technical area contract support will include system development and engineering changes to MCE's software, system analysis of Program of Record (PoR) systems and future systems, technical readiness assessments, and stakeholder technical interchange meetings/events. This support includes the creation and implementation of Functional Support Agreements (FSAs) between PM Mission Command and various Government support agencies such as the Combat Capabilities Development Command (CCDC) C5ISR (Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance) Center, and other PEOs (e.g. PEO GCS). Program Management efforts in the FY 2021 timeframe will also include business area support to ensure funding and contracts are planned and available for all SW development, system engineering, and DT efforts.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: PM Support (Matrix & Contractor) increased to fulfill staffing level required for FY21 requirements.</p>		1.224	0.909	1.461
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>		-	0.475	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Funding transferred in accordance with Title 15 USC ?638				
Accomplishments/Planned Programs Subtotals		18.463	10.464	18.582
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
N/A				
D. Acquisition Strategy				
<p>The Mounted Computing Environment (MCE) is the Army's initiative to provide simple and intuitive Mission Command on-the-Move (MCOTM) and situational awareness down to the platoon level. It is standards based, protected and supports incremental improvements with additional application capabilities over time. MCE will leverage the existing JBC-P hardware and network, and be deployed as a software upgrade to replace the legacy JBC-P software. It will support a common look and feel and is part of the solution enabling leaders to lead and fight their formations from anywhere they choose.</p> <p>MCE is utilizing an incremental development approach, leveraging DevOps, to ensure capability satisfies requirements and addresses Warfighter feedback. This agile development process injects enhancements into the baseline software, making it easier to incorporate technological advances. The project office conducts commercial software assessments to determine applicability and suitability for inclusion in the MCE baseline.</p> <p>Software development increments and fielding decisions will be implemented with an agile 2 year capability set tech insertion construct. Software development will be manageable, tailorable, and scalable in the Capability Assessment Package (CAP) format to enable better management of capability delivery. MCE's v3.1 First Unit Equipped (FUE) is scheduled for 4QFY22; subsequent SW versions are planned to implement over-the-air updates reducing the sustainment footprint necessary to deploy and maintain multiple software baselines.</p> <p>MCE's Materiel Development Decision (MDD) is scheduled for 2QFY20.</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 / 5				PE 0604818A / Army Tactical Command & Control Hardware & Software				EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)							
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
PM Support (Matrix & Contractor)	Various	PM Mission Command : Aberdeen Proving Ground, MD	3.376	1.224	Nov 2018	0.909		1.461	Nov 2020	-		1.461	Continuing	Continuing	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.475		-		-		-	0.000	0.475	-
Subtotal			3.376	1.224		1.384		1.461		-		1.461	Continuing	Continuing	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
Software Development	Various	PM Mission Cmd, Multiple Matrix Orgs and SW Dev Contractors : Aberdeen Proving Ground, MD	16.882	12.632	Dec 2018	8.045		13.758	Dec 2020	-		13.758	Continuing	Continuing	-
Software/Systems Engineering	Various	PM Mission Cmd, Multiple Matrix Orgs and SW Dev Contractors : Aberdeen Proving Ground, MD	19.195	1.728	Nov 2018	0.382		0.851	Nov 2020	-		0.851	Continuing	Continuing	-
Subtotal			36.077	14.360		8.427		14.609		-		14.609	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, Evaluation and Integration	MIPR	Multiple Test Agencies; Multiple	4.990	2.879	Nov 2018	0.653		2.512	Jan 2021	-		2.512	Continuing	Continuing	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)	

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				
MCE Arch, System Engr & Dev	[Blue bar]																															
	MCE v3.1 SE & Dev																															
MCE v3 Customer Test	[Blue bar]																															
	MCE v3 CT (NIE 18.2)																															
Developmental Operations (DevOps)	[Blue bar]																															
	MCE v3.1: Engineering Releases (ERs) 1-5																															
Materiel Development Decision (MDD)																	1															
																	MCE MDD															
N-CFT's ITN 19 Experimentation Event																	[Blue bar]															
																	ITN 19 Event															
Preliminary Design Review (PDR)																	2															
																	MCE v3.1 PDR															
Developmental Test (DT)																	[Blue bar]															
																	MCE v3.1 DT															
Critical Design Review (CDR)																	3															
																	MCE v3.1 CDR															
Limited Deployment Decision (LDD)																	4															
																	MCE v3.1 LDD															
System Software Acceptance Test (SSAT)																	[Blue bar]															
																	MCE v3.1 SSAT															
MCE Arch, System Engr & Dev 2																	[Blue bar]															
																	MCE v3.2 SE & Dev															
Planned Operational Test (OT)																	[Blue bar]															
																	MCE v3.1 OT															
Planned Army Interoperability Certification (AIC)																	[Blue bar]															
																	MCE v3.1 AIC															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)

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 Decision (FDD)													5 MCE v3.1 FDD															
First Unit Equipped (FUE)													6 MCE v3.1 FUE															
System Software Acceptance Test (SSAT) 2													MCE v3.2 SSAT															
MCE Arch, System Engr & Dev 3													MCE v3.3 SE & Dev															
Planned Operational Assessment (OA)													MCE v3.2 OA															
Planned Army Interoperability Certification (AIC) 2													MCE v3.2 AIC															
Software Materiel Release (SMR)													7 MCE v3.2 SMR															
MCE Arch, System Engr & Dev 4													MCE v3.4 SE & Dev															
Software Materiel Release (SMR) 2													8 MCE															

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MCE v3 Test & Integration	3	2017	4	2018
MCE Arch, System Engr & Dev	1	2019	4	2021
MCE v3 Customer Test	1	2019	1	2019
Developmental Operations (DevOps)	2	2019	4	2021
Matériel Development Decision (MDD)	2	2020	2	2020
N-CFT's ITN 19 Experimentation Event	2	2020	2	2020
Preliminary Design Review (PDR)	4	2020	4	2020
Developmental Test (DT)	1	2021	1	2021
Critical Design Review (CDR)	2	2021	2	2021
Limited Deployment Decision (LDD)	2	2021	2	2021
System Software Acceptance Test (SSAT)	4	2021	4	2021
MCE Arch, System Engr & Dev 2	1	2022	4	2023
Planned Operational Test (OT)	1	2022	1	2022
Planned Army Interoperability Certification (AIC)	1	2022	2	2022
Full Deployment Decision (FDD)	4	2022	4	2022
First Unit Equipped (FUE)	4	2022	4	2022
System Software Acceptance Test (SSAT) 2	4	2023	1	2024
MCE Arch, System Engr & Dev 3	1	2024	4	2024
Planned Operational Assessment (OA)	1	2024	1	2024
Planned Army Interoperability Certification (AIC) 2	1	2024	3	2024
Software Matériel Release (SMR)	4	2024	4	2024
MCE Arch, System Engr & Dev 4	1	2025	4	2025

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: February 2020	
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) EJ5 / <i>MOUNTED COMPUTING ENVIRONMENT (MCE)</i>		

Events	Start		End	
	Quarter	Year	Quarter	Year
Software Materiel Release (SMR) 2	4	2025	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EJ6 / TACTICAL ENHANCEMENT			
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
EJ6: TACTICAL ENHANCEMENT	-	10.085	0.000	7.860	-	7.860	0.000	0.000	0.000	0.000	0.000	17.945
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line is directly aligned to 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.

Tactical Enhancement supports the evaluation and testing requirements for Troposcatter Transmission (TROPO) capabilities procured and fielded under the Signal Modernization (SIGMOD) funding line, B00010. TROPO will provide redundancy communications in a Satellite denied environment by providing improved Line of Sight and beyond line of sight radio systems.

In addition this funding will support development of Network Centric Waveform-Resilient (NCW-R). NCW-R is a critical, near-term set of modifications to the current Tactical Network SATCOM waveform that will provide limited protection against our adversaries' ability to jam tactical SATCOM Command and control communications on Wideband Global SATCOM (WGS) satellites. NCW-R will provide anti-jam capability and resiliency to Tactical Network satellite terminals in contested environments. The NCW-R waveform software will operate on Tactical Network satellite modems. NCW-R will provide a bridging capability until the next generation protected satellite constellation is launched by the Air Force (projected FY 2028/2029). The current anti-jam protection is limited to two SMART-T terminals per BCT, division and Corps HQs, leaving battalions vulnerable to being isolated during jamming events.

SIGMOD Capabilities:

TROPO: Enables Mission Command in a Satellite Denied environment by providing Beyond Line of Sight (BLOS) capability over longer ranges and at higher throughput than the current BLOS System. TROPO extends the network by utilizing a significantly reduced SWaP radio verses the current system. TROPO will enable Army units to reduce reliance on costly satellite bandwidth.

FY 2021: Funds support TROPO Initial Operational Test & Evaluation efforts to support Full Rate Production Decision in FY 2022

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

	FY 2019	FY 2020	FY 2021
Title: IOT&E for TROPO systems	-	-	7.860
Description: Funds support the following efforts:			
FY 2021 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ6 / TACTICAL ENHANCEMENT

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Funds will be used for TROPO IOT&E testing requirement			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Increase (\$7.860M) funds is for TROPO IOT&E testing			
<i>Title:</i> Development of NCW-R <i>Description:</i> Funds are for the following effort.	0.916	-	-
<i>Title:</i> Development of TROPO Planner <i>Description:</i> Funds are for the following effort:	1.392	-	-
<i>Title:</i> Army Withold and Unit Task Reorganization (UTR) Realignment <i>Description:</i> Funds are for the following effort:	7.777	-	-
Accomplishments/Planned Programs Subtotals	10.085	-	7.860

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>
• B00010: Signal Modernization Program	82.180	128.913	160.469	-	160.469	190.053	224.085	221.048	260.035	Continuing	Continuing

Remarks
B00010 : OPA funding line for Signal Modernization (SIGMOD)

D. Acquisition Strategy
These funds will be used to conduct System Evaluation and Formal Testing of the various Signal Mod capabilities, specifically the TROPO systems. This is in order to facilitate integration into the Tactical Networks. These test events will meet all mandatory testing requirements with full ATEC oversight. This Acquisition Strategy will integrate proven Commercial-Off-The-Shelf (COTS) capabilities into existing Tactical Network nodes to expand and enhance network capacity and user access. The TROPO capabilities are acquired as ACAT III programs to replace legacy equipment in the field while utilizing DoDI 5000.02 standard acquisition approaches, starting with Milestone C Determination for TROPO (4QFY18).

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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 / 5				PE 0604818A / Army Tactical Command & Control Hardware & Software				EJ6 / TACTICAL ENHANCEMENT							
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
Sig Mod	SS/FP	TBD : TBD	-	1.392	Aug 2019	-		-		-		-	0.000	1.392	-
Army Withhold and Unit Task Reorganization (UTR) Realignment	SS/FPF	Harris Corp : Arlington, VA	-	7.777	Aug 2019	-		-		-		-	0.000	7.777	-
Subtotal			-	9.169		-		-		-		-	0.000	9.169	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
NCW-R	SS/CPFF	CODES1403AALION SCIENCE AND TECHNOLOGY CORPORATION : 202BURR RIDGE IL 60527-0849FACILITY	26.500	0.916	Jan 2019	-		-		-		-	0.000	27.416	-
Subtotal			26.500	0.916		-		-		-		-	0.000	27.416	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
TRILOS Testing	MIPR	ATEC : Aberdeen Proving Ground, MD	19.823	-		-		-		-		-	0.000	19.823	-
TROPO Testing	MIPR	ATEC : Aberdeen Proving Ground, MD	-	-		-		7.860	Apr 2021	-		7.860	0.000	7.860	-
Subtotal			19.823	-		-		7.860		-		7.860	0.000	27.683	N/A
Project Cost Totals			46.323	10.085		0.000		7.860		-		7.860	0.000	64.268	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ6 / TACTICAL ENHANCEMENT

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
NCW-R Developmental Testing					NCW-R Developmental Testing																							
NCW-R Certification					NCW-R Certification																							
NCW-R Operational Testing					NCW-R Operational Testing																							
IOT&E for TROPO													IOT&E TROPO															
IOC for TROPO																	1 IOC TROPO											
FRP for TROPO																					2 FRP TROPO							

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) EJ6 / <i>TACTICAL ENHANCEMENT</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
NCW-R Developmental Testing	2	2020	1	2021
NCW-R Certification	3	2020	1	2021
NCW-R Operational Testing	4	2020	1	2021
IOT&E for TROPO	1	2022	3	2022
IOC for TROPO	4	2022	4	2022
FRP for TROPO	1	2023	1	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT			
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
EK9: TACTICAL NETWORK OPERATIONS AND MANAGEMENT	-	7.631	3.649	3.375	-	3.375	0.000	0.000	0.000	0.000	0.000	14.655
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Tactical Network Operations (NetOps) Management (TNOM) is the official nomenclature for the funding line. Unified Network Operations (UNO) is the effort that the funding line funds.

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.

Tactical Network Operations Management's (TNOM) purpose is to create Unified Network Operations (UNO). UNO is a software centric, integrated NetOps capability being developed, as a rapid prototype - proceeding under Section 804, mid-tier acquisition (MTA) authority granted by the Army Acquisition Executive (AAE)'s 14 May 2019 Acquisition Decision Memorandum (ADM). Enabling common planning, configuration, monitoring, provisioning, management, and defense of the Network, UNO configures and integrates tactical and enterprise networks to allow delivery of information and communications among Soldiers at all echelons utilizing network resources prioritized according to the Commander's intent. In developing UNO, TNOM follows the Army's development operations (DevOps) approach - creating Network Operations (NetOps) prototypes, gaining user feedback, making adjustments and ultimately delivering enhanced capabilities to the operational force in the shortest time possible. UNO development incorporates solutions available in industry and through government agencies - assessing them in an adapt-and-buy approach informed by experimentation, demonstration, and modernization.

FY 2021 funding supports MTA (Section 804) rapid prototyping efforts of UNO v1.0 via NetOps capabilities that build upon current efforts, efforts that align with Chief of Staff of the Army (CSA) guidance to provide delivery of a simplified NetOps capabilities across the tactical network, and include emerging capability requirements stemming from Network Cross-Functional Team (CFT) initiatives and directed requirements. UNO will also support the delivery of integrated capabilities to plan, install, operate, maintain, and secure the Army's end-to-end network in support of the commander's mission priorities. Army's approved requirements for UNO are found in the Integrated Tactical Network (ITN) Abbreviated - Capability Definition Document (A-CDD) dated 26 June 2019.

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

	FY 2019	FY 2020	FY 2021
Title: Product Development	7.631	3.484	3.375
Description: Network Planner provides the product development of workflows that guide Soldiers through planning the Tactical Radios, SATCOM Line of Sight (LOS) and TROPO systems, automates the analysis process to recommend locations to place			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT

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

	FY 2019	FY 2020	FY 2021
<p>LOS Nodes based on Area of Responsibility, improves Planning accuracy for Antenna & Radio templates, based on updated performance parameters, simplifies configuration operations through the use of a centralized network database and supports Unit Task Reorganization (UTR), and provides consistent look and feel with embedded training.</p> <p>Network Management provides the product development into the Network Common Operational Picture (COP) for all tactical networks systems, management to Tactical Radios, SATCOM Line of Sight (LOS) and TROPO systems, network status information to monitor and adjust the network to meet mission requirements, and consistent look and feel with embedded training.</p> <p>FY 2020 Plans: FY 2020 funding will continue support of MTA (Section 804) rapid prototyping efforts of UNO v1.0 via NetOps capabilities to address CSA priorities, and include emerging capability requirements stemming from Network CFT initiatives and requirements. Support delivering integrated capabilities to plan, install, operate, maintain, and secure the Army's end-to-end network in support of the commander's mission priorities.</p> <p>Capabilities UNO will expand based upon Network CFT initiatives and requirements are Network Management, Integrated Planner, Radio Planner, and Federated Data Repository utilizing the try, buy, decide strategy put forth by Army leadership.</p> <p>Development of UNO's Radio Planner capability provides the ability to plan and create configuration files as well as manage the latest Tactical radio elements of the Department of Defense Information Network ? Army (DoDIN-A) and monitoring focused on the status of mission network services effectivity.</p> <p>Development of the UNO's Network Management function will provide the ability to manage and troubleshoot the network elements that comprise the DoDIN-A, monitor a local node for network health status, performance, location, and security, in addition to displaying monitored data to the local operator. Management elements include, but are not limited to, the Command Post, Brigades, Echelons, etc.</p> <p>UNO's improvement of the Integrated Planner functionality allows NetOps capabilities to plan, manage and operate the Tactical Internet DoDIN-A with common operating picture, automate the planning functions and the resource management to support unit task organization, and interface with managers and monitors.</p> <p>Continued advancement of UNO's Federated Data Repository enables unit task reorganization (UTR) acting as the distributed data store for NetOps data and provide services that will be used by NetOps planning and management systems and a federated</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>data store that operates over existing Army Tactical networks, typically characterized as a Disconnected, Intermittent and Bandwidth Limited (DIL) operating environment.</p> <p>FY 2021 Plans: FY 2021 funding will support MTA (Section 804) rapid prototyping efforts of UNO via NetOps capabilities that build upon current efforts, expand those efforts to address CSA priorities, and include emerging capability requirements stemming from Network CFT initiatives and directed requirements. Support development, assessments, and deliveries of integrated capabilities to plan, install, operate, maintain, and secure the Army's end-to-end network in support of the commander's mission priorities.</p> <p>UNO's MTA will support prototyping of NetOps capabilities that enable command and control of the Tactical Network which will provide simplicity via a Common Operating Picture (COP), a flexible framework enabling rapid integration of future commercial/ government tools, and reliable network information to the Soldiers.</p> <p>The Network Planner and Network Management capabilities will support Network CFT initiatives and directed requirements utilizing the adapt and buy approach, as well as modernization, put forth by Army leadership.</p> <p>Continues product development of the simplified Network Planner functionality, which enables automated NetOps capabilities to plan, manage and operate the Tactical Network via user workflows and reduces the cognitive burden to the Soldiers. Will continue development of Radio Planning capabilities in order to plan and create configuration files for emerging Integrated Tactical Network (ITN) radios and waveforms.</p> <p>Continues product development of the simplified Network Management functionality, which enables the management and troubleshooting of the network elements that comprise the Tactical Network by monitoring local nodes for network health status, performance, location, and security, in addition to displaying monitored data to the local operator. Will continue enhancement and integration of the Federated Data Repository, which reduces time in task to the Soldiers and enables rapid Unit Task Reorganization (UTR).</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The FY 2020 to FY 2021 decrease of \$274K is from prioritizing all appropriated funding towards Network Planner and Network Management capability development within the MTA rapid prototyping timeline, which began 26 June 2019 after receiving Section 804, Mid-Tier Acquisition (MTA) authority granted by the Army Acquisition Executive (AAE)'s 14 May 2019 Acquisition Decision Memorandum (ADM).</p>				
Title: FY 2020 SBIR/STTR Transfer		-	0.165	-
Description: Funding transferred in accordance with Title 15 USC ?638				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<i>FY 2020 Plans:</i> Funding transferred in accordance with Title 15 USC ?638			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	7.631	3.649	3.375

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>
• BA9312: NETWORK MANAGEMENT SYSTEM	6.896	13.534	5.230	-	5.230	5.363	5.524	5.529	5.583	0.000	47.659

Remarks
BA9312 (I-NetOps Trailboss) investments into UNO provide engineering support and integration of Network Planner and Network Management capabilities. Continued investments provide ability to conduct DevOps w/ Soldier feedback via Pilot exercises, e.g. Fifth Generation Technology Insertion (5GTI) and Expeditionary Signal Brigades-Enhanced (ESB-E).

D. Acquisition Strategy
Unified Network Operations (UNO) (EK9) is proceeding under Section 804, mid-tier acquisition (MTA) authority granted by the Army Acquisition Executive (AAE)'s 14 May 2019 Acquisition Decision Memorandum (ADM).

UNO will leverage the MTA (Section 804) Rapid Prototyping acquisition strategy allowing for rapid prototyping of NetOps Solutions using incremental development and employing Commercial Off-The-Shelf (COTS) innovative technologies to demonstrate new Plan, Manage, Provision, and Secure Network capabilities that meet Army modernization and operational needs. UNO will provide adequate experimentation and incorporate Soldier feedback to mitigate cost, schedule, and performance risks early in program lifecycle, receive analysis of technology/design maturity and component integration/interoperability, and provide requirement refinement.

The objective of the MTA (Section 804) is to develop and deliver prototypes into experimentation events for user feedback through FY 2024 within simulated operational environment(s) in order to provide operational capabilities within five years of the development of an approved requirement.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.165		-		-		-	0.000	0.165	-
Subtotal			-	-		0.165		-		-		-	0.000	0.165	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/BPA	TBD : TBD	-	7.631	Apr 2019	3.484	Feb 2020	3.375	Jan 2021	-		3.375	0.000	14.490	-
Subtotal			-	7.631		3.484		3.375		-		3.375	0.000	14.490	N/A

Remarks
 FY 2021 funding will support MTA (Section 804) rapid prototyping efforts of UNO v1.0 via NetOps capabilities that build upon current efforts, expand those efforts to address CSA priorities, and include emerging capability requirements stemming from Network CFT initiatives and directed requirements. Support delivering integrated capabilities to plan, install, operate, maintain, and secure the Army's end-to-end network in support of the commander's mission priorities. The two capabilities that will be expanded upon based on Network CFT initiatives and directed requirements are Network Management and Network Planner capabilities utilizing the adapt and buy approach put forth by Army leadership.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY18 Congressional Rescission	C/TBD	NA : NA	4.655	-		-		-		-		-	0.000	4.655	-
Subtotal			4.655	-		-		-		-		-	0.000	4.655	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		
Project Cost Totals			4.655	7.631	3.649	3.375	-	3.375	0.000	19.310	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT

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
MTA Request to DASM																												
UNO MTA (Section 804) AAE Approval																												
UNO MTA (Section 804) Rapid Prototyping Start																												
UNO v1.0 DevOps, Prototype User Feedback, & Testing																												
UNO v1.0 Transition Pathway Decision																												
UNO v1.0 FQT/OA																												
UNO v1.0 Transition Decision																												
UNO v1.1 Capability Decision Point																												
UNO v1.0 Transitioned to CS21																												
UNO v1.1 DevOps, Prototype User Feedback, & Testing																												
UNO v1.1 Transition Pathway Decision																												
UNO v1.1 FQT/OA																												
UNO v1.1 Transition Decision																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT

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												
UNO v1.1 Delivered																	██████████				██████████				██████████				██████████											
UNO v1.2 DevOps, Prototype User Feedback, & Testing																	██████████				██████████				██████████				██████████				██████████				██████████			
UNO v1.1 Transition to CS23																																	8							
UNO v1.2 Capability Decision Point																																	9							
UNO v1.2 Transition Pathway Decision																																	10							
UNO v1.2 FQT/OA																																	11							
UNO MTA (Section 804) Rapid Prototyping Completion																																	12							
UNO v1.3 Capability Decision Point																																	13							
UNO v1.2 Transition Decision																																	14							
UNO v1.2 Transition to CS25																																					15			

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT

Note
At each transition pathway decision, all UNO capabilities will be analyzed to determine the best transition from the Section 804, mid-tier acquisition (MTA) rapid prototyping authority. Transition options include, but are not limited to, instituting an Engineering Change Proposal (ECP) into an existing Program of Record (PoR), obtaining authority to utilize the traditional JCIDS acquisition process, or obtain authorization to utilize the Section 804, mid-tier acquisition (MTA) rapid fielding authority.

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MTA Request to DASM	2	2019	2	2019
UNO MTA (Section 804) AAE Approval	3	2019	3	2019
UNO MTA (Section 804) Rapid Prototyping Start	3	2019	3	2019
UNO v1.0 DevOps, Prototype User Feedback, & Testing	4	2019	4	2020
UNO v1.0 Transition Pathway Decision	1	2020	1	2020
UNO v1.0 FQT/OA	4	2020	4	2020
UNO v1.0 Transition Decision	4	2020	4	2020
UNO v1.1 Capability Decision Point	4	2020	4	2020
UNO v1.0 Transitioned to CS21	4	2020	3	2021
UNO v1.1 DevOps, Prototype User Feedback, & Testing	4	2020	4	2022
UNO v1.1 Transition Pathway Decision	1	2022	1	2022
UNO v1.1 FQT/OA	3	2022	3	2022
UNO v1.1 Transition Decision	4	2022	4	2022
UNO v1.1 Delivered	4	2022	3	2023
UNO v1.2 DevOps, Prototype User Feedback, & Testing	4	2022	3	2024
UNO v1.1 Transition to CS23	3	2023	3	2023
UNO v1.2 Capability Decision Point	1	2024	1	2024
UNO v1.2 Transition Pathway Decision	1	2024	1	2024
UNO v1.2 FQT/OA	3	2024	3	2024
UNO MTA (Section 804) Rapid Prototyping Completion	3	2024	3	2024
UNO v1.3 Capability Decision Point	4	2024	4	2024
UNO v1.2 Transition Decision	4	2024	4	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: February 2020	
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT		

Events	Start		End	
	Quarter	Year	Quarter	Year
UNO v1.2 Transition to CS25	4	2025	4	2025

Note

Program projects MTA (Section 804) approval will support rapid prototyping efforts of UNO via NetOps capabilities that build upon current efforts, expand those efforts to address CSA priorities, and include emerging capability requirements stemming from Network Cross Functional Team (CFT) initiatives and directed requirements. Support delivering integrated capabilities to plan, install, operate, maintain, and secure the Army's end-to-end network in support of the commander's mission priorities. UNO's capabilities will expand on Network CFT initiatives and directed requirements are Network Management, Integrated Planner, Radio Planner, and Federated Data Repository utilizing the try, buy, decide strategy put forth by Army leadership.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)			
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
EQ8: <i>Mobile/Handheld Computing Environment (M/HHCE)</i>	-	9.130	4.857	5.155	-	5.155	5.163	5.172	5.180	5.247	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project EQ8 - The Common Operating Environment (COE) is an approved set of computing technologies and standards that enables secure and interoperable applications to be developed and executed rapidly across a variety of computing environments. The Mobile/Handheld Computing Environment (M/HHCE) is one of the six computing environments under the COE, which provides the standards for all Army hand held applications enabling the use of common End User Devices by Soldiers, thereby eliminating redundant devices and reducing the Soldiers' load.

The M/HHCE is directly aligned to the Army Network Modernization Strategy Line of Effort (LOE) 1 (Unified Network). M/HHCE also supports the Army Network Modernization Strategy LOE 2 (Common Operating Environment). These efforts are aligned to the Army's Tactical Network Capability Set development and fielding plans by utilizing (1) interoperable data, message, and waveforms, (2) sensors and applications that enable operations across domains and (3) integration with Joint C4ISR and strike capabilities. Nett Warrior (NW) and Integrated Visual Augmentation System (IVAS) are the instantiation of the M/HHCE and comply with the technical standards documented by the M/HHCE and provide the dismounted common computational platform for other products relevant to dismounted Soldiers. Through compliance with the M/HHCE, software applications from other programs are integrated with the NW and IVAS systems, reducing the need for duplicate hardware resulting in reduced Soldier Load. NW leverages commercial smart phone devices and secure Army tactical radios to provide the dismounted leader an integrated mission command and situational awareness capability for use during combat operations. NW applied feedback from conventional and Special Operations units to procure and implement Secret and Secure But Unclassified (SBU) networking equipment for BCTs and the Security Force Assistance Brigades to enable faster, more flexible Mission Command data exchanges with Joint and Coalition forces while maintaining the existing integrated mission command capability with Mounted CE (e.g., JBCP) system. NW uses Commercial-Off-The-Shelf (COTS) and Non Developmental (NDI) communications equipment to create a robust and flexible Integrated Tactical Network that enables faster and more accurate decision making in fights at the tactical level.

Requirements for the M/HH CE are established in the AROC approved COE Information Systems Initial Capability Document (IS ICD), the M/HHCE Requirements Definition Package (RDP), and the NW Capability Development Document in lieu of Capability Production Document. This project is in the Army's Top 100 Modernization efforts.

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

	FY 2019	FY 2020	FY 2021
Title: Test and Evaluation	1.971	0.965	1.070
Description: Test and Evaluation including annual Army Expeditionary Warrior Experiment (AEWE) and Joint Warfighting Assessment (JWA) to gain Soldier feedback.			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>FY 2020 Plans: Continue NW test and 3rd party applications evaluation for technical verification at developmental test events and user verification. Conduct a planned assessment of Integrated Tactical Network (ITN) in an IBCT. Support NW as a baseline NIE/JWA system including: Brigade level support, equipping, training, and spares for NW; conduct yearly Army Interoperability Certification; environmental testing; and Information Assurance penetration prevention testing for new commercial smart devices, software and accessories. Support Army Expeditionary Warrior Experiment (AEWE) testing.</p> <p>FY 2021 Plans: Continue NW test and 3rd party applications evaluation for technical verification at developmental test events and user verification. Conduct a planned assessment of Integrated Tactical Network (ITN) in an S/ABCT. Support NW as a baseline JWA system including: Brigade level support, equipping, training, and spares for NW; conduct yearly Army Interoperability Certification; environmental testing; and Information Assurance penetration prevention testing for new commercial smart devices, software and accessories. Support Army Expeditionary Warrior Experiment (AEWE) testing.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 minor increase to support SBCT and ABCT assessment.</p>				
<p>Title: Hardware and Software Integration and Evaluation for Capability Improvements</p> <p>Description: Hardware and Software Integration and Evaluation for Capability Improvements</p> <p>FY 2020 Plans: Continue to evaluate next End User Devices (EUD) and associated hardware components to stay aligned with commercial and Army evolving requirements. Provide NW software / hardware updates to support incorporation of 3rd party software applications onto NW EUD platform, Army Interoperability Certification (AIC) and cyber security testing. Support DARPA Squad X integration and transition. Update software to M/HH CE standards as revised to maintain compliance with COE. Continue integration of Cyber Electromagnetic Activities (CEMA) capability into the NW system to support EW threat detections and location finding.</p> <p>FY 2021 Plans: Continue to evaluate next End User Devices (EUD) and associated hardware components to stay aligned with commercial and Army evolving requirements. Provide NW software / hardware updates to support incorporation of 3rd party software applications onto NW EUD platform, Army Interoperability Certification (AIC) and cyber security testing. Support DARPA integration and transition of future technologies. Update software to M/HHCE standards as revised to maintain compliance with COE. Continue integration of Cyber Electromagnetic Activities (CEMA) capability into the NW system to support EW threat detections and location finding.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>		3.758	1.879	1.420

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
FY 2021 reductions reflect decreased requirement to integrate with 3rd Party Applications.				
<p>Title: Software Development & Integration</p> <p>Description: Funding is provided for the following efforts.</p> <p>FY 2020 Plans: Continue to evaluate next generation NW map engine and Operating System (OS) trade studies and Assured Position, Navigation and Timing (PNT) software development efforts with NW. Update NW Software Development Kit (SDK) with new functionality. Continue software upgrades to ITN component software based on security and operational requirements. Continue incorporating the Army's Common Operating Environment (COE) 3.0 Cross-Cutting Capabilities into NW software. Continue development of NW's next generation Service Oriented Architecture.</p> <p>FY 2021 Plans: Continue to evaluate next generation NW map engine and Operating System (OS) trade studies and Assured Position, Navigation and Timing (PNT) software development efforts with NW. Update NW Software Development Kit (SDK) with new functionality. Continue software upgrades to ITN component software based on security and operational requirements. Continue incorporating the Army's Common Operating Environment (COE) 3.0 Cross-Cutting Capabilities into NW software. Continue development of NW's next generation Service Oriented Architecture and Tactical Assault Kit plug-ins.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Integration of COE 3.0 into SW release build efforts in FY 2021.</p>		1.002	0.469	1.621
<p>Title: Conduct SEPM Support to NW</p> <p>Description: Conduct Systems Engineering and Program Management Support to Nett Warrior</p> <p>FY 2020 Plans: Continue to conduct government systems / software engineering and program management support for NW program. Will collect input from Soldiers to improve NW size, weight, power, fightability, safety and effectiveness via surveys. Will manage system configuration, and execute test, development and integration planning including investigation and analysis of emerging innovative commercial technologies to reduce the size, weight, power, cost, increase NW and ITN functionality.</p> <p>FY 2021 Plans: Continue to conduct government systems / software engineering and program management support for NW program. Will collect input from Soldiers to improve NW size, weight, power, fightability, safety and effectiveness via surveys. Will manage system</p>		1.721	1.024	0.750

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
configuration, and execute test, development and integration planning including investigation and analysis of emerging innovative commercial technologies to reduce the size, weight, power, cost, increase NW and ITN functionality. FY 2020 to FY 2021 Increase/Decrease Statement: Reduction in testing, surveys for Soldier feedback, and fewer agile development cycles.			
Title: M/HHCE Governance Description: Development of the M/HHCE standards and M/HHCE governance. FY 2020 Plans: Continue to provide Mobile Handheld Computing Environment (MHH/CE) governance and standards development for external program integration to eliminate separate handheld devices and reduce Soldier load. Maintain compliance with overarching COE standards. FY 2021 Plans: Continue to provide Mobile Handheld Computing Environment (M/HHCE) governance and standards development for external program integration with NW and IVAS to eliminate separate handheld devices and reduce Soldier load. Maintain compliance with overarching COE standards. FY 2020 to FY 2021 Increase/Decrease Statement: Reduction in the requirement for M/HHCE governance.	0.678	0.299	0.294
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638	-	0.221	-
Accomplishments/Planned Programs Subtotals	9.130	4.857	5.155

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• R80501: Ground Soldier System	36.506	116.265	154.937	-	154.937	182.025	185.295	188.627	190.514	0.000	1,054.169

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)
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C. Other Program Funding Summary (\$ in Millions)

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

D. Acquisition Strategy

To capitalize on commercial industry's investment in advanced smart device technology as well as innovation and changes within Army, NW requires annual RDT&E funding for integration and evaluation of new technology. Through this process and at low cost, the Army is able to integrate and evaluate for combat utility the hundreds of millions spent in product development by the major commercial device manufactures. The Nett Warrior (NW) program provides situational awareness and mission command to dismounted combat leaders through a secure commercial smart device, power source, cables and the Integrated Tactical Network. NW funds development and evaluation of new technology and software integration through a combination of competitively awarded contracts. Various existing follow on procurement contracts are utilized to procure a combination of COTs and GOTs NW equipment to include supporting services. NW program completed LRIP/MS C in 2012 followed by two LRIP decisions in 2013-14 in preparation for IOT&E under DOT&E oversight in 4QFY14- 1QFY15. This IOT&E event led to an additional NW Low Rate Initial Production (LRIP) decision in 2015 and a Full Rate Production Decision in FY17. Now in production, NW seeks operational feedback and uses the DevOps process to identify and implement new capabilities. M/HHCE standards are updated annually under the M/HHCE governance process.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020				
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)								
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	
System Engineering & Program Management Support	Various	Various : Various	4.656	1.721		1.356		0.750		-		0.750	Continuing	Continuing	-	
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.221		-		-		-	0.000	0.221	-	
Subtotal			4.656	1.721		1.577		0.750		-		0.750	Continuing	Continuing	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	
Hardware/Software Integration & Evaluation	Various	Various : Various	7.819	3.578		1.868		1.420		-		1.420	Continuing	Continuing	-	
MHH Governance	MIPR	Various : Various	8.272	1.758		-		0.294		-		0.294	Continuing	Continuing	-	
Subtotal			16.091	5.336		1.868		1.714		-		1.714	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	
Software Development and Integration	Various	Various : Various	4.077	1.002		0.458		1.621		-		1.621	Continuing	Continuing	-	
Subtotal			4.077	1.002		0.458		1.621		-		1.621	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	Various	Various : Various	4.258	1.071		0.954		1.070		-		1.070	Continuing	Continuing	-	
Subtotal			4.258	1.071		0.954		1.070		-		1.070	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 / 5			R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)				
	Prior Years	FY 2019	FY 2020		FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals	29.082	9.130	4.857		5.155	-	5.155	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)

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
New EUD test and evaluation + LTE (OT) FY19	█																											
DARPA Squad X transition Phase 1 FY19	█																											
Mech Unit with Nett Warrior DT FY19		█																										
Software Update Testing (CS-18/19) FY19		█	█																									
New Hardware capability testing (Env/CBRNE/Intel) FY19			█																									
3rd Party Integration FY19			█																									
TCAPS Integration FY19				█																								
Mobile Hand Held Compliance Testing (FY19)				█																								
Robotics and Mobile Sensor Testing FY19				█																								
New EUD test and evaluation + LTE (DT) FY20					█																							
New Hardware capability testing (Env/CBRNE/Intel) FY20						█	█																					
Mobile Hand Held Compliance Testing (FY20)																												
Mech Unit with Nett Warrior DT FY20						█																						

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)

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		
Robotics and Mobile Sensor Testing FY20								■																						
Software Update Integration FY20						■																								
3rd Party Integration FY20							■	■																						
Robotics and Mobile Sensor Testing FY21									■	■	■	■																		
New EUD test and evaluation + LTE (OT) FY21										■	■	■																		
New Hardware capability testing (Env/CBRNE/Intel) FY21										■	■	■																		
Software Update Testing (CS-18/19) FY21										■	■	■																		
Mobile Hand Held Compliance Testing (FY21)																■														
Mech Unit with Nett Warrior OT FY21											■	■																		
Software Update Integration FY21												■																		
Mobile Hand Held Compliance Testing (FY22)															■	■														
Software Update Integration FY22																■														
Mobile Hand Held Compliance Testing (FY23)																			■	■	■	■								

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)	

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
DARPA Share Transition																												
DARPA Share secure communication evaluation																												
DARPA Share formal testing																												
Software Update Integration FY23																												
New EUD Test and evaluation																												
Mobile Hand Held Compliance Testing																												
Software Update Integration (FY24)																												
3rd Party Integration																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
New EUD test and evaluation + LTE (OT) FY19	1	2019	2	2019
DARPA Squad X transition Phase 1 FY19	1	2019	4	2019
Mech Unit with Nett Warrior DT FY19	2	2019	2	2019
Software Update Testing (CS-18/19) FY19	2	2019	3	2019
New Hardware capability testing (Env/CBRNE/Intel) FY19	3	2019	3	2019
3rd Party Integration FY19	3	2019	3	2019
TCAPS Integration FY19	4	2019	4	2019
Mobile Hand Held Compliance Testing (FY19)	4	2019	4	2019
Robotics and Mobile Sensor Testing FY19	4	2019	4	2019
New EUD test and evaluation + LTE (DT) FY20	1	2020	1	2020
New Hardware capability testing (Env/CBRNE/Intel) FY20	2	2020	3	2020
Mobile Hand Held Compliance Testing (FY20)	4	2020	4	2020
Mech Unit with Nett Warrior DT FY20	2	2020	2	2020
Robotics and Mobile Sensor Testing FY20	4	2020	4	2020
Software Update Integration FY20	2	2020	2	2020
3rd Party Integration FY20	3	2020	4	2020
Robotics and Mobile Sensor Testing FY21	1	2021	3	2021
New EUD test and evaluation + LTE (OT) FY21	2	2021	3	2021
New Hardware capability testing (Env/CBRNE/Intel) FY21	2	2021	3	2021
Software Update Testing (CS-18/19) FY21	2	2021	3	2021
Mobile Hand Held Compliance Testing (FY21)	4	2021	4	2021
Mech Unit with Nett Warrior OT FY21	3	2021	3	2021

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)
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Events	Start		End	
	Quarter	Year	Quarter	Year
Software Update Integration FY21	4	2021	4	2021
Mobile Hand Held Compliance Testing (FY22)	3	2022	3	2022
Software Update Integration FY22	4	2022	4	2022
Mobile Hand Held Compliance Testing (FY23)	3	2022	3	2023
DARPA Share Transition	3	2019	4	2022
DARPA Share secure communication evaluation	3	2020	4	2020
DARPA Share formal testing	3	2021	4	2021
Software Update Integration FY23	4	2022	4	2023
New EUD Test and evaluation	1	2024	2	2024
Mobile Hand Held Compliance Testing	3	2024	3	2024
Software Update Integration (FY24)	3	2024	4	2024
3rd Party Integration	3	2022	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) ER9 / Expeditionary Army Command Post			
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
ER9: Expeditionary Army Command Post	-	33.052	28.895	58.436	-	58.436	53.195	20.089	9.998	0.000	0.000	203.665
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line is directly aligned to the Army Network Modernization Strategy Line of Effort (LOE) #4 Command Post. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

Program will implement capabilities in a two increment approach. Increment 1 will implement prototype capabilities as identified in signed Directed Requirement and Increment 2 will execute the requirements identified in Capability Development Document (CDD) due for review/approval in 2QFY20. These capabilities will enable the Army to employ command posts across the operational spectrum, from early entry to major combat operations that will resolve current command post issues with set up and tear down, survivability, mobility, suitability and footprint.

The Command Post Integrated Infrastructure (CPI2) program addresses the requirements for more mobile, scalable, interoperable, and agile command posts. Currently fielded command posts are deemed too large and take too long to setup and teardown making them vulnerable to near peer detection and targeting technologies. By integrating mission command warfighting functions on to formation appropriate vehicle platforms, a dispersed command post construct will enable the battle staff to blend in with the overall maneuver formation while giving the commander the ability to synchronize the close fight on the move. This dispersed mobile command post consists of Mission Command Platforms (MCPs) and Command Post Support Vehicles (CPSVs). The MCP is a formation appropriate vehicle that provides digital workstations for all mission command warfighting functions. The CPSV is the hub of the dispersed command post; it hosts mission command servers, radios, local area network components and a secure wireless capability. Specific to CORPS/DIV, CPI2 will provide a Mobile Command Group (MCG) consisting of formation appropriate platforms that supports Corps/Div Commanders/Staff with high priority functions while on the move.

FY 2021 initiates Inc 2 portion of the program to address design engineering and prototype development for formation-appropriate MCPs, MCGs, and CPSVs and includes design changes to platform shelters as required based on results of experimentation. Funds will also support integration and testing for Increment 1 with 2 BCT's and a Division Main to obtain user feedback to drive future requirements. Includes funding for engineering changes, test and training, CPI2 program management.

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

	FY 2019	FY 2020	FY 2021
Title: Program Office Management	2.490	2.741	4.178
Description: Contractor/Matrix Labor support and program travel.			
FY 2020 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Contract and Matrix personnel to support CPI2 in achieving mission requirements to include managing multiple design/ prototyping efforts, test events and training. This efforts funding will be executed by Program Executive Office Command, Control, Communications - Tactical.</p> <p>FY 2021 Plans: Contract and Matrix personnel to support CPI2 in achieving mission requirements to include managing multiple design/ prototyping efforts, test events and training. This efforts funding will be executed by Program Executive Office Command, Control, Communications - Tactical.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Staff increase to support both the directed requirement (Inc 1) and initiation of CDD program (Inc 2).</p>				
<p>Title: Product Development</p> <p>Description: Includes the costs for design/integration/fabrication and prototyping efforts to address capability gaps identified in current Army command post formations. Costs include ancillary items and platform requirements.</p> <p>FY 2020 Plans: Product Development continues efforts initiated in FY19 for System Design, Development Engineering and Platform Integration/ Assembly to achieve delivery of two Brigade Combat Teams (BCT's) and a Division Main. Includes engineering and prototyping fixes following user assessments to inform the future CPI2 solutions. This efforts funding will be executed by Program Executive Office Command, Control, Communications Tactical.</p> <p>FY 2021 Plans: FY 2021 initiates the funding for the design engineering, and prototype development of formation appropriate platforms (Stryker, FMTV, APMV, JLTV) to meet design requirements for Command Post Mission Command Platform (MCP) , Command Post Support Vehicles (CPSV) and Mobile Command Groups (MCG) . Additional design improvements for platforms to be addressed based on unit feedback. Includes costs to deliver 2 Brigade Combat Teams and a Division Main for unit experimentation for CPI2 Increment 1. Funding includes costs to address engineering change proposals and program management. This efforts funding will be executed by Program Executive Office Command, Control, Communications Tactical.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to initiating Inc 2 requirements to design/develop formation appropriate MCP, CPSV, MCG platforms, most notably the Stryker platform.</p>		30.562	22.934	49.758
<p>Title: Systems Test and Evaluation</p> <p>Description: Costs required for test activities to inform CPI2 solution set.</p>		-	0.217	3.750

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p>FY 2020 Plans: Includes costs for test events in FY 2020 for Health and Hazard assessments as well as initial planning for Safety release and confirmation. This efforts funding will be executed by Program Executive Office Command, Control, Communications - Tactical.</p> <p>FY 2021 Plans: Conduct initial test/safety activities necessary for completion of delivery of two brigade combat teams and a Division main, as well as formation appropriate platform testing (Stryker, FMTV, APMV, JLTV) associated with design improvements for Command Post MCP, CPSV and MCG. This efforts funding will be executed by Program Executive Office Command, Control, Communications - Tactical.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase for testing activities for 2 Brigade Combat Teams and a Division Main not previously executed.</p>			
<p>Title: Support Costs</p> <p>Description: Program costs for training and development of data packages.</p> <p>FY 2020 Plans: Supports development of data packages and New Equipment Training (NET) for planned fielding's in FY 2020. This efforts funding will be executed by Program Executive Office Command, Control, Communications - Tactical.</p> <p>FY 2021 Plans: Funding supports updates necessary to technical data packages and training for test events as well as initial design changes with formation appropriate platforms (Stryker, AMPV, FMTV, JLTV). This efforts funding will be executed by Program Executive Office Command, Control, Communications - Tactical.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease in FY 2021 due to fact that planning and development models for training are prepared and completed in the fiscal year prior to test events.</p>	-	1.691	0.750
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>	-	1.312	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Funding transferred in accordance with Title 15 USC 7638			
Accomplishments/Planned Programs Subtotals	33.052	28.895	58.436

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
• B29801: CPI2	2.284	-	49.947	-	49.947	84.442	233.695	395.174	339.057	Continuing	Continuing

Remarks

D. Acquisition Strategy

The CPI2 Materiel Development Decision (MDD) Acquisition Decision Memorandum was signed on 21 June 2018 and directs CPI2 to be executed in a two increment approach. Increment 1 will develop capabilities to address needs identified in the signed Command Post (CP) Directed Requirement (DR) to field 5 Brigade Combat Teams (BCT) , a Division and a platform based Mobile Command Group (MCG) to 1 Division and 1 Corps. Using the buy, try, assess, and decide acquisition model which leverages user experimentation to inform follow-on program requirements. Increment 1 will prototype and integrate available commercial off the shelf (COTS) as well as government programs of record (PORs) equipment that provide mission command and communications functions within the command post. Increment 2 will execute requirements per the CPI2 Capability Development Document (CDD) to replace designated legacy command post systems at Corps, Division, Brigade combat Team's, their subordinate Battalion (BN) formations and select Multi-functional Support Brigades (MFSB).

Increment 1 will work with the government and with industry to capitalize on their experiences with mobile Command Posts to perform risk reduction events on experimental solutions for the Command Post Support Vehicle and Mission Command Platform as outlined in the Command Post Directed Requirement (DR).

CPI2 Inc 1 will develop the BCT #1 through experimentation conducted with Combat Capabilities Development Center (CCDC) via a Functional Support Agreement (FSA) for BCT #1. CPI2 will leverage industry advancements and innovation using full and open competition with the C5SIR Other Transaction Authority (OTA) to design and prototype the MCP/CPSV for the BCT #2. CPI2 will experiment at the Division main executing an Indefinite Delivery Indefinite Quantity (IDIQ) contract. CPI2 will deliver a platform based Mobile Command Group (MCG) to 1 Division via an FSA with Project Manager (PM) Stryker Brigade Combat Team (SBCT). The integration efforts will culminate with test events on all prototype designs, leading to a Milestone in FY21 to select the Command Post (CP) solution set for fielding the remaining 3 BCTs and 1 MCG to a Corps identified in the CP DR.

The CPI2 CDD specifies Increment 2 requirements and is scheduled for AROC review/approval on 7 Feb 2020. A Milestone B in 3QFY20 for Inc 2 will authorize RDTE efforts to focus on design/development of unit appropriate platforms which will be executed via FSA with platform Program of Record (POR) contracts. A Milestone C for Increment 2 in FY23 will initiate the fielding of CPI2 to designated Army units. Future editions of the CDD will incorporate feedback based on prototype experimentation, user feedback and advances in technology. CPI2 plans to compete a contract with industry for the design, engineering, test and production of the CDD solution for CPI2. Additionally, CPI2 will leverage existing contracts managed by Joint Program Office Light Tactical Vehicle (JPO JLTV), Product Manager (PdM) Armored Multi-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) ER9 / <i>Expeditionary Army Command Post</i>
<p>Purpose Vehicle (AMPV) and PM SBCT for integration efforts associated with their respective platforms. This will encompass CPI2 variants at designated Corps, Division, Brigade, Battalion and select Multi-Functional Support Brigades.</p>		

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PM MC Labor	Allot	PM MC : Aberdeen Proving Ground MD	0.108	-		-		-		-		-	Continuing	Continuing	Continuing
SETA Support	MIPR	CACI : Aberdeen Proving Ground, MD	-	0.770	Mar 2019	1.290	Oct 2019	1.964	Oct 2020	-		1.964	Continuing	Continuing	Continuing
Matrix Support	MIPR	Various : Aberdeen Proving Ground, MD	-	1.720	Feb 2019	1.650	Oct 2019	2.214	Oct 2020	-		2.214	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.312		-		-		-	0.000	1.312	-
Subtotal			0.108	2.490		4.252		4.178		-		4.178	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
BCT 1 Design/Fabrication/Installation	MIPR	CCDC-C5ISR : Aberdeen Proving Ground, MD	-	4.296	Mar 2019	2.699	Dec 2019	2.947	Oct 2020	-		2.947	Continuing	Continuing	Continuing
BCT 2 Design/Fabrication/Installation	C/FFP	ELBIT : Ft.Worth, Texas	-	4.129	Sep 2019	8.305	Mar 2020	3.482	Oct 2020	-		3.482	Continuing	Continuing	Continuing
Division Design/Fabrication/Installation	C/IDDQ	BRTRC : Ft.Bliss, Texas	-	1.338	Sep 2019	5.505	Jan 2020	5.736	Oct 2020	-		5.736	Continuing	Continuing	Continuing
Vehicle Platforms	Allot	PdM MPVS : Detroit Aresnal, MI	-	9.764	Feb 2019	0.623	Jan 2020	-		-		-	Continuing	Continuing	Continuing
Ancillary Items	MIPR	Various : Various	-	3.122	Feb 2019	3.477	Oct 2019	1.175	Oct 2020	-		1.175	Continuing	Continuing	Continuing
Vehicle Integrated Power	MIPR	DRS : Hunstville, AL	-	3.514	Aug 2019	-		-		-		-	Continuing	Continuing	Continuing
ISO Containers	Allot	BERG : Spokane, WA	9.493	1.607	Aug 2019	-		-		-		-	Continuing	Continuing	Continuing
Mobile Command Group Development	MIPR	PM SBCT : Warren, MI	-	0.345	Jul 2019	-		3.102	Oct 2020	-		3.102	Continuing	Continuing	Continuing
Secure Wireless Mesh Remote Endpoint Hardware	C/IDIQ	CHS : Aberdeen Proving Ground, MD	-	2.447	Sep 2019	-		-		-		-	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 / 5				PE 0604818A / Army Tactical Command & Control Hardware & Software				ER9 / Expeditionary Army Command Post							
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
Network Switches	MIPR	CISCO : San Jose, CA	-	-		0.964	Oct 2019	-		-		-	Continuing	Continuing	Continuing
Unified Voice Management System (UVMS)	MIPR	SCI : Huntsville, AL	-	-		0.964	Oct 2019	-		-		-	Continuing	Continuing	Continuing
Stryker platform Design/ Development	Allot	PM SBCT : Detroit, MI	-	-		-		22.037	Oct 2020	-		22.037	Continuing	Continuing	Continuing
AMPV platform Design/ Development	Allot	PM AMPV : Detroit Aresnal, MI	-	-		-		5.209	Oct 2020	-		5.209	Continuing	Continuing	Continuing
JLTV platform Design/ Development	Allot	PM JLTV : Detroit , MI	-	-		-		2.850	Oct 2020	-		2.850	Continuing	Continuing	Continuing
FMTV platform design/ development	Allot	PdM MPVS : Detroit, MI	-	-		-		1.752	Oct 2020	-		1.752	Continuing	Continuing	Continuing
Rigid Wall Shelters design/ development	MIPR	CCDC-SC : Natick, MI	-	-		-		1.468	Oct 2020	-		1.468	Continuing	Continuing	Continuing
Subtotal			9.493	30.562		22.537		49.758		-		49.758	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
Tech Manuals/Training Development Packages	TBD	Multiple : Multiple	-	-		2.008	Feb 2020	0.750	May 2021	-		0.750	Continuing	Continuing	Continuing
Subtotal			-	-		2.008		0.750		-		0.750	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
Systems Test and Evaluation	MIPR	Various : Various	-	-		0.098	Mar 2020	3.750	Nov 2020	-		3.750	Continuing	Continuing	Continuing
Subtotal			-	-		0.098		3.750		-		3.750	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post

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: MS A	▲ 1																											
Inc 1: MS A																												
Inc 1: Product Development (BCT 1)																												
Inc 1: FSA Prod Dev (BCT 1)																												
Inc 1: BCT 1 Safety Testing																												
Inc 1: Safety BCT 1																												
Inc 1: BCT 1 New Equipment Training																												
Inc 1: NET BCT 1																												
Inc 1: BCT 1 Limited User Test																												
Inc 1: LUT BCT 1																												
Inc 1: Product Development (BCT 2) OTA																												
Inc 1: BCT 2																												
Inc 1: BCT 2 Safety Testing																												
Inc 1: Safety BCT 2																												
Inc 1: New Equipment Training (BCT 2)																												
Inc 1: NET BCT 2																												
Inc 1: Limited User Test (BCT 2)																												
Inc 1: LUT BCT 2																												
Inc 1: Milestone C																												
Inc 1: CPI2 MS C																												
Inc 1: OPA Production (BCT 3-4-5), Revisit BCT 1, 2																												
Inc 1: OTA BCT 3-5, 1-2																												
Inc 1: BCT 3 -4 -5 Fielding																												
Inc 1: OPA Fielding to DR Units																												
Inc 1: Retrofit BCT 1, BCT 2																												
Inc 1: Retrofit BCT 1, 2																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post

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: Conditional Materiel Release											5																	
Inc 2 AROC					2																							
Inc 2 MS B							3																					
Inc 2: Platform Design/Dev																												
Inc 2: Platform Test Events																												
Inc 2: Technology Updates/Insertions																												
Inc 2: MS C																	6											
Inc 2: Integration/Production																												
Inc 2: Fielding																												
Inc 2: Operational Test and Evaluation																												
Inc 2: FRP																												
Inc 1: MCG Experimentation																												
Inc 1: MCG New Equipment Training																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post

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: MCG Operational Assessment																																				
Inc 1: Division Main Experiment																																				
Inc 1: Division Main Safety Test																																				
Inc 1: Division Main New Equipment Training																																				
Inc 1: Division Limited User Test																																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Directed Requirement Signed	1	2018	1	2018
CPI2 MDD	3	2018	3	2018
Inc 1: MS A	2	2019	2	2019
Inc 1 Product Development (BCT 1)	2	2019	2	2021
Inc 1: BCT 1 Safety Testing	3	2020	1	2021
Inc 1: BCT 1 New Equipment Training	1	2021	2	2021
Inc 1: BCT 1 Limited User Test	2	2021	2	2021
Inc 1: Product Development (BCT 2) OTA	4	2019	3	2021
Inc 1: BCT 2 Safety Testing	4	2020	2	2021
Inc 1 New Equipment Training (BCT 2)	2	2021	3	2021
Inc 1: Limited User Test (BCT 2)	3	2021	3	2021
Inc 1: Milestone C	4	2021	4	2021
Inc 1: OPA Production (BCT 3-4-5), Revisit BCT 1, 2	4	2021	4	2023
Inc 1: BCT 3 -4 -5 Fielding	4	2022	4	2023
Inc 1: Retrofit BCT 1, BCT 2	2	2022	4	2023
Inc 1: Conditional Materiel Release	4	2021	4	2021
Inc 2 AROC	2	2020	2	2020
Inc 2 MS B	3	2020	3	2020
Inc 2: Platform Design/Dev	1	2021	4	2022
Inc 2: Platform Test Events	2	2021	3	2022
Inc 2: Technology Updates/Insertions	1	2023	4	2025
Inc 2: MS C	1	2023	1	2023

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post
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Events	Start		End	
	Quarter	Year	Quarter	Year
Inc 2: Integration/Production	1	2023	1	2028
Inc 2: Fielding	3	2024	4	2035
Inc 2: Operational Test and Evaluation	1	2025	1	2025
Inc 2: FRP	3	2025	3	2025
Inc 1: MCG Experimentation	1	2021	4	2021
Inc 1: MCG New Equipment Training	3	2021	4	2021
Inc 1: MCG Operational Assessment	4	2021	4	2021
Inc 1: Division Main Experiment	4	2019	4	2021
Inc 1: Division Main Safety Test	1	2021	2	2021
Inc 1: Division Main New Equipment Training	3	2021	4	2021
Inc 1: Division Limited User Test	4	2021	4	2021

Note

INC 2 events assume approval of CPI2 CDD that will delineate Inc 2 requirements. The CPI2 CDD is planned for AROC on 7 Feb 2020.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development			
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
EW3: Unit Task Reorganization (UTR) Development	-	30.234	27.539	19.748	-	19.748	31.357	17.500	13.810	13.988	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project EW3, Unit Task Reorganization (UTR), supports the Army's 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.

UTR supports the Army Network Plan Framework objective to deliver a Standards Based Network Architecture. This will enable the modernization of the Mission Command Network through the coordination of a common set of network operations tools and infrastructure development supporting the unit communication staff's ability to conduct Network Planning, Network Provisioning and Network Management. Network Planning includes the development of an integrated planning tool suite to improve Signal Soldiers ability to plan and develop configurations for upcoming operations and deployments. Network Provisioning includes the development of tools and technology that provide a means to deliver configurations developed during the Network Planning with little to no manual involvement by the Soldier. Network Management results in the replacement of stove-piped management systems and with integrated tools that provide a consolidated, as well as detailed, view of the network and its components.

FY 2021 UTR funding will be used to continue development of network components that support centralized data, security, and information exchanges; continue development of Network Planning functions to plan the tactical network to continue development of Radio Planning capabilities in order to plan and create configuration files for emerging ITN radios and waveforms; continue development of network device and radio provisioning systems and continue the development of a network manager that monitors and displays network health status, performance, location and security to local operator.

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

	FY 2019	FY 2020	FY 2021
Title: Standards Based Architecture	4.112	6.299	4.248
Description: UTR is supporting the development of various elements to facilitate the commander and staff's ability to execute their wartime functions. This element includes the development of data models, interface standards, and data repositories that enable devices, and network planners, provisioners and managers to communicate network status, security and control data. UTR is leveraging Over the Network (OTN) and Over the Air (OTA) methods to query, load, activate, and monitor network devices.			
FY 2020 Plans: Continue development of network components that support centralized data, security, and information exchanges, enabling Signal Soldier activities.			
FY 2021 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Continue development of network components that support centralized data, security, and information exchanges, enabling Signal Soldier activities. Additional developing the use of Over the Network and Over the Air capabilities as well as Direct Connection devices that enable automated provisioning, patching, and monitoring.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Decrease of \$2.3M reflects reduction in development of Federated Data Repository advancements in FY 2020 to enhancements in FY 2021.</p>				
<p>Title: Network Planning</p> <p>Description: UTR is supporting the development of an integrated planning tool suite that will improve the ability of Signal Soldiers to plan and develop configurations for upcoming operations and deployments. This tool suite will provide a holistic planning capability for between the mission command systems and the network planning tools.</p> <p>FY 2020 Plans: Development of analytic and planning tools that support Signal Planning in coordination with Mission Command Systems and Applications.</p> <p>FY 2021 Plans: Continue development of the Network Planning functions that enable automated NetOps capabilities to plan the tactical network, reducing the cognitive burden to Soldiers, as well as development of analytic and planning tools that support Signal Planning in coordination with Mission Command Systems and Applications.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase of \$1.9M reflects reduction of Federated Data Repository advancements in FY 2020 to enhancements in FY 2021.</p>		7.227	2.833	4.982
<p>Title: Network Provisioning</p> <p>Description: UTR is implementing tools and technology to reduce the amount of time and troops required to provision network devices with configurations developed during the planning process. This provides a means to deliver configurations without requiring manual involvement by the Soldier, and for devices to report configuration and operational status IAW Standards Based Architecture.</p> <p>FY 2020 Plans: Continued development of provisioning systems to increase Over the Network and Over the Air capabilities as well as Direct Connection devices that automate provisioning, patching, and updating.</p> <p>FY 2021 Plans:</p>		10.443	7.576	7.956

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Continue development of provisioning systems, and support system integration into use of Standards Based Architecture, including continuing development of Radio capabilities in order to plan and create configuration files for emerging ITN radios and waveforms FY 2020 to FY 2021 Increase/Decrease Statement: Increase of \$.1M reflects minor adjustments associated with escalation.				
Title: Network Management Description: UTR introduces improvements to the way the network is managed, reducing stovepiped management systems and replacing them with integrated tools that provide a consolidated, as well as detailed, view of the network and its components. FY 2020 Plans: - Continue P2P development, eOTAM oversight, API development and test support - Continue development of eOTAM code for data reduction, security updates, and radio reporting - Continue support for On Demand Information Network (ODIN) application development on COE v3 and CERDEC support for testing and potential ramp off. FY 2021 Plans: Continue product development of Network Management functionality enabling the ability to manage and troubleshoot the network devices that comprise the Tactical Network, monitor nodes for network health status, performance, location, and security, in addition to displaying monitored data to the local operator. FY 2020 to FY 2021 Increase/Decrease Statement: \$7.4M of FY 2021 UTR funding was rephased into FY 2022. Decrease of \$7.4M reflects partial deferral of network management efforts until FY 2022.		3.158	8.954	1.764
Title: System of Systems Engineering and Portfolio Management Description: Systems engineering and program management support to include development and maintenance of the NetOps architecture, Systems Engineering Plan, Risk Management Plan, Rapid Prototyping, IPT Management, Requirements Engineering, Integrated Master Schedule, and budget formulation and execution. FY 2020 Plans: Continue Systems of Systems Engineering and program management across NetOps portfolio including establishing Architecture and updates of portfolio Management Plan, Risk Management Plan, Rapid Prototyping, IPT/Working Group Management, Requirements Engineering, synchronization of efforts in Integrated Master Schedule. FY 2021 Plans:		0.277	0.626	0.798

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Continue Systems of Systems Engineering and program management across NetOps portfolio including establishing Architecture and updates of portfolio Management Plan, Risk Management Plan, Rapid Prototyping, IPT/Working Group Management, Requirements Engineering, synchronization of efforts in Integrated Master Schedule.			
FY 2020 to FY 2021 Increase/Decrease Statement: Minor decrease associated with reduced SE/PM requirements.			
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638	-	1.251	-
FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	25.217	27.539	19.748

	FY 2019	FY 2020
Congressional Add: Secure Wireless - Small Form Fit Factor	5.017	-
FY 2019 Accomplishments: Secure Wireless - Small Form Fit Factor		
Congressional Adds Subtotals	5.017	-

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

N/A
Remarks

D. Acquisition Strategy

Unit Task Reorganization (UTR) is an overarching effort that supports the establishment of a standards-based network architecture and integration of requirements across multiple efforts in the tactical network. UTR resources are applied directly to current products which are modified through Engineering Change Proposals and Modified Work Orders to comply with network standards. This enables current systems to share the information, reducing time and task for soldiers as well as new systems to access the network. Efforts are enduring to react to evolving prioritization of requirements. A variety of contracting approaches are used depending on needs, such as Other Transactions, Indefinite Delivery/Indefinite Quantity, or Systems Engineering Technical Assistance.

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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 / 5				PE 0604818A / Army Tactical Command & Control Hardware & Software				EW3 / Unit Task Reorganization (UTR) Development							
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	-	-		1.251		-		-		-	0.000	1.251	-
Subtotal			-	-		1.251		-		-		-	0.000	1.251	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
Standards Based Architecture	Various	MA-IDIQ : Various	0.801	2.211	Aug 2019	3.308	Aug 2020	2.817	Aug 2021	-		2.817	Continuing	Continuing	Continuing
Standards Based Architecture	C/CPFF	GSA BAH : APG MD	0.652	-		-		-		-		-	0.000	0.652	-
Standards Based Architecture	C/BPA	Various : TBD	2.902	1.901	Apr 2019	2.929	Apr 2020	1.431	Jan 2021	-		1.431	Continuing	Continuing	Continuing
Network Planning	Various	Various : Various	2.534	0.610	Nov 2018	-		-		-		-	0.000	3.144	-
Network Planning	C/BPA	To Be Determined : To Be Determined	-	6.617	Apr 2019	2.927	Apr 2020	4.982	Jan 2021	-		4.982	Continuing	Continuing	Continuing
Network Provisioning	C/IDIQ	Microsoft : Redmond, WA	8.663	7.142	Mar 2019	2.815	Mar 2020	3.831	Nov 2020	-		3.831	Continuing	Continuing	Continuing
Network Provisioning	MIPR	Matrix Organizations : APG MD	0.962	2.101	Nov 2018	3.498	Nov 2019	2.925	Nov 2020	-		2.925	Continuing	Continuing	Continuing
Network Provisioning	FFRDC	MITRE : Boston MA	2.400	1.200	Oct 2018	1.044	Oct 2019	1.200	Oct 2020	-		1.200	Continuing	Continuing	Continuing
Network Management	MIPR	WSEC : APG, MD	1.900	-		-		-		-		-	0.000	1.900	-
Network Management	C/BPA	TBD : APG, MD	-	2.638	Apr 2019	9.048	Apr 2020	1.764	Jan 2021	-		1.764	0.000	13.450	-
Network Management	MIPR	PEO Soldier : Arlington VA	0.300	0.520	Mar 2019	-		-		-		-	0.000	0.820	-
Secure Wireless - SFF	C/Various	Various : Various	-	5.017	Jan 2020	-		-		-		-	0.000	5.017	-
Subtotal			21.114	29.957		25.569		18.950		-		18.950	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development	

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
Network Management																												
Network Manager Phase 1																												
Network Manager Phase 2																												
Network Manager Phase 3																												
Network Manager Phase 4																												
Network Manager Phase 5																												
Network Manager Phase 6																												
Network Planning																												
JENM 3.5																												
Radio Planner																												
Radio Planner v1.1																												
Radio Planner v1.2																												
Radio Planner v1.3																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development	

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
Network Planner	2																											
Network Planner v1.0																												
Network Planner v1.1																												
Network Planner v1.2																												
Network Planner v1.3																												
Network Planner v1.4																												
Network Provisioning																												
Rapid Provisioning System (RPS) 2.4																												
Network Provisioning System 3.0																												
Network Provisioning System 4.0																												
Network Provisioning System 4.1																												
Network Provisioning System 4.2																												
Network Provisioning System 4.3																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software		Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development	

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				
Network Provisioning System 4.4																																
Radio Provisioning																																
Black Sails 2.0																																
Black Sails 2.1																																
Black Sails 2.2																																
Black Sails 2.3																																
Radio Provisioner x.1																																
Radio Provisioner x.2																																
Radio Provisioner x.3																																
Radio Provisioner x.4																																
Radio Provisioner x.5																																
Standard Based Architecture																																
Data Repository																																

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development

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
Codex 1.0	▲																											
Codex 1.1																												
Data Repository x.x																												
Radio Standards																												
eOTAM 2.0																												
Radio Standards version x.1																												
Radio Standards version x.x																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Network Management	1	2019	4	2024
Network Manager Phase 1	1	2019	4	2019
Network Manager Phase 2	1	2020	4	2020
Network Manager Phase 3	1	2021	4	2021
Network Manager Phase 4	1	2022	4	2022
Network Manager Phase 5	1	2023	4	2023
Network Manager Phase 6	1	2024	4	2024
Network Planning	1	2020	4	2024
JENM 3.5	1	2019	4	2019
Radio Planner	1	2019	2	2021
Radio Planner v1.0	4	2018	4	2018
Radio Planner v1.1	1	2020	2	2020
Radio Planner v1.2	3	2020	4	2020
Radio Planner v1.3	1	2021	2	2021
Network Planner	1	2020	4	2024
Network Planner v1.0	1	2020	4	2020
Network Planner v1.1	1	2021	4	2021
Network Planner v1.2	1	2022	4	2022
Network Planner v1.3	1	2023	4	2023
Network Planner v1.4	1	2024	4	2024
Network Provisioning	1	2019	4	2024
Rapid Provisioning System (RPS) 2.4	2	2019	2	2019

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development
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Events	Start		End	
	Quarter	Year	Quarter	Year
Network Provisioning System 3.0	3	2020	4	2020
Network Provisioning System 4.0	1	2021	4	2021
Network Provisioning System 4.1	1	2022	4	2022
Network Provisioning System 4.2	1	2023	4	2023
Network Provisioning System 4.3	1	2024	4	2024
Network Provisioning System 4.4	1	2025	4	2025
Radio Provisioning	1	2019	4	2025
Black Sails 2.0	3	2019	3	2019
Black Sails 2.1	4	2019	4	2019
Black Sails 2.2	1	2020	1	2020
Black Sails 2.3	2	2019	4	2020
Radio Provisioner x.1	1	2021	4	2021
Radio Provisioner x.2	1	2022	4	2022
Radio Provisioner x.3	1	2023	4	2023
Radio Provisioner x.4	1	2024	4	2024
Radio Provisioner x.5	1	2025	4	2025
Standard Based Architecture	1	2019	4	2025
Data Repository	1	2019	4	2025
Codex 1.0	1	2019	1	2019
Codex 1.1	1	2020	4	2020
Data Repository x.x	1	2021	4	2025
Radio Standards	1	2019	4	2025
eOTAM 2.0	3	2019	4	2020
Radio Standards version x.1	4	2020	4	2021
Radio Standards version x.x	1	2022	4	2025

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar 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	-	37.847	95.720	109.259	-	109.259	116.381	65.512	69.343	30.849	0.000	524.911
E10: <i>Sentinel</i>	-	37.847	95.720	109.259	-	109.259	116.381	65.512	69.343	30.849	0.000	524.911

A. Mission Description and Budget Item Justification

This system is a component of the overall Air and Missile Defense (AMD) architecture and will provide for an incrementally fielded Integrated Air and Missile Defense Fire Control System/capability for the composite Army Air and Missile Defense Brigades. The Sentinel system is a key component of the Army Integrated Air and Missile Defense (AIAMD) architecture and provides critical air surveillance of the forward areas.

Sentinel consists of a radar-based sensor with its prime mover/power, Identification Friend or Foe (IFF), and Forward Area Air Defense (FAAD) Command, Control and Intelligence (C2I) interfaces. The radar is deployed in both an air defense role and a force protection role for Counter-Rocket, Artillery, and Mortar (C-RAM) missions. The sensor is an advanced three-dimensional battlefield X-Band air defense phased-array radar with an instrumented range of 75 kilometers. Sentinel is capable of operating day or night, in adverse weather conditions, in the battlefield environments of dust, smoke, aerosols and enemy countermeasures. It provides 360-degree azimuth coverage for acquisition tracking. Sentinel contributes to the digital battlefield by automatically detecting, classifying, identifying and reporting targets (cruise missiles, unmanned aircraft systems, rotary wing and fixed wing aircraft). Sentinel acquires targets sufficiently forward of the battle area to allow weapons reaction time and engagement at optimum ranges. Sentinel's integrated IFF reduces the potential for fratricide of US and Coalition aircraft.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	39.289	105.243	103.427	-	103.427
Current President's Budget	37.847	95.720	109.259	-	109.259
Total Adjustments	-1.442	-9.523	5.832	-	5.832
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-9.523			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.442	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	5.832	-	5.832

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>				Project (Number/Name) E10 / <i>Sentinel</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
E10: <i>Sentinel</i>	-	37.847	95.720	109.259	-	109.259	116.381	65.512	69.343	30.849	0.000	524.911
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Mission & System Description:

This system is a component of the overall Air and Missile Defense (AMD) architecture and will provide for an incrementally fielded Integrated Air and Missile Defense Fire Control System/capability for the composite Army Air and Missile Defense Brigades. The Sentinel system is a key component of the Army Integrated Air and Missile Defense (AIAMD) architecture and provides critical air surveillance of the forward areas.

Sentinel consists of a radar-based sensor with its prime mover/power, Identification Friend or Foe (IFF), and Forward Area Air Defense (FAAD) Command, Control and Intelligence (C2I) interfaces. The radar is deployed in both an air defense role and a force protection role for Counter-Rocket, Artillery, and Mortar (C-RAM) missions. The sensor is an advanced three-dimensional battlefield X-Band air defense phased-array radar with an instrumented range of 75 kilometers. Sentinel is capable of operating day or night, in adverse weather conditions, in the battlefield environments of dust, smoke, aerosols and enemy countermeasures. It provides 360-degree azimuth coverage for acquisition tracking. Sentinel contributes to the digital battlefield by automatically detecting, classifying, identifying and reporting targets (cruise missiles, unmanned aircraft systems, rotary wing and fixed wing aircraft). Sentinel acquires targets sufficiently forward of the battle area to allow weapons reaction time and engagement at optimum ranges. Sentinel's integrated IFF reduces the potential for fratricide of US and Coalition aircraft.

The Research and Development funding supports Sentinel modernization/upgrades to address obsolescence issues and capabilities gaps. Sentinel A4 modernization efforts will increase detection, recognition and identification range by 100%, add RAM detection, increase electronic protect and allow for system capability growth through FY 2050 to address evolving threat.

FY 2021 Funds address the following:

The Active Electronically Scanned Array (AESA) (Sentinel A4) is the next generation of radar technology to replace the current phase and frequency scanned array used by Sentinel today. The AESA Antenna will provide increased capability including extended range for ground-based surveillance and situational awareness, faster and more accurate Non-Cooperative Target Recognition (NCTR) for clearing fires and preventing fratricide, improved Fire Control (FC) quality track accuracy, and management of larger track loads. The AESA will also provide improved operation in severe/urban clutter. The system will detect and track small targets, such as Unmanned Aircraft Systems (UAS) and Cruise Missiles, in clutter and will detect and track slow targets, such as UAS and Rotary Wing (RW) aircraft, at low altitudes in clutter. The system will detect, track, and classify Rocket, Artillery, and Mortar (RAM) threats and will support Integrated Air and Missile Defense Battle Command System (IBCS) requirements and can contribute sensor support for mitigating current and future Indirect Fire Protection Capability Increment 2 mission requirements. The Sentinel A4 will incorporate Mode S technologies.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>	Project (Number/Name) E10 / <i>Sentinel</i>
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Electronic Attack/Electronic Protect (EA/EP) addresses the electronic countermeasures (ECM) gap. This effort continues through the life of the radar, addressing both changing threats and electronic counter measure gaps.

Counter Rocket, Artillery & Mortars (C-RAM) capability increase to current Sentinel A3's effectiveness against the Low, Slow, Small (LSS), UAS, Cruise Missile, and RAM threat. This effort develops and implements advanced waveforms and processing to significantly enhance RAM capabilities. These efforts will provide fire control quality data to support LSS, UAS, CM, and RAM interceptors.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: Product Development</p> <p>Description: Funding is provided for the following efforts:</p> <p>FY 2020 Plans: Will integrate firmware, software and hardware. Design and build prototype subsystems/components for testing. Complete software code coding and modification of the system search and track logic, clutter mapping, and waveforms for Counter Rocket, Artillery, & Mortar (C-RAM) and Counter Unmanned Aircraft System (C-UAS) missions as well as the Resiliency and Software Assurance Modification (RSAM) upgrade effort. Characterize performance, design & replace firmware, software and hardware. Perform technical assessments, concept studies, cost reduction, risk reduction, threat analysis, and required documentation. Continue development of Active Electronically Scanned Array (AESA) technology, conduct design reviews for Sentinel AESA (Sentinel A4), begin procurement of material for Engineering and Manufacturing Development (EMD) assets.</p> <p>FY 2021 Base Plans: Will complete procurement of material for Sentinel A4 Engineering and Manufacturing Development (EMD) assets and will begin integration of firmware, software and hardware for Sentinel A4 EMD assets. Will continue to perform technical assessments, concept studies, cost reduction, risk reduction, threat analysis, and required documentation for Sentinel A3.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Overall product development funding increases due to the integration efforts for the Engineering and Manufacturing Development (EMD) prototype production for the Sentinel A4 program.</p>	33.112	89.698	105.268	-	105.268
<p>Title: Test & Evaluation</p> <p>Description: Funding is provided for the following efforts:</p> <p>FY 2020 Plans:</p>	4.735	1.675	3.991	-	3.991

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / Radar Development	Project (Number/Name) E10 / Sentinel

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Will conduct software qualification test and hardware verification testing, field testing against representative targets. Prepare logistics products and required documentation for materiel release of software and hardware upgrades. FY 2021 Base Plans: Will conduct software qualification test and hardware verification testing, field testing against representative targets. Prepare logistics products and required documentation for materiel release of software and hardware upgrades for Sentinel A3. FY 2020 to FY 2021 Increase/Decrease Statement: FY 2020 to FY 2021 funding has a increase to support planned test events for Sentinel A3.					
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638	-	4.347	-	-	-
Accomplishments/Planned Programs Subtotals	37.847	95.720	109.259	-	109.259

C. Other Program Funding Summary (\$ in Millions)	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
• EF9: System Integration and Test	74.295	97.746	0.166	-	0.166	0.169	-	-	-	0.000	172.376
• 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
• C50016: System Integration and Test Procurement	105.395	107.157	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• FM3: Future Interceptor	-	2.000	7.992	-	7.992	7.993	7.993	7.993	7.993	0.000	41.964
• 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
• DU3: IFPC2	10.324	-	0.000	-	0.000	-	-	-	-	0.000	10.324
• 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
• C62001: IFPC Inc 2-I Block 1 Missile 1	166.536	-	0.000	-	0.000	-	-	-	-	0.000	166.536

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / Radar Development	Project (Number/Name) E10 / Sentinel
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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
• 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
• FI4: Maneuver - Short Range Air Defense (M-SHORAD)	75.711	42.900	4.995	-	4.995	39.863	271.946	308.415	446.026	0.000	1,189.856
• C14300: M-SHORAD - Procurement	-	233.300	378.654	158.300	536.954	330.738	80.412	436.129	728.215	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

Remarks

These programs are an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

D. Acquisition Strategy

Sentinel was procured from Raytheon as a non-developmental item. Raytheon owns the Technical Data Package (TDP) for the Sentinel A3 and its predecessors and therefore no other contractor has the technical ability to modify the Sentinel radar or Sentinel software. The modifications planned for the Sentinel that fall into this category are: Electronic Attack/Electronic Protect; Signal Data Processor; North Finding Module; Medium Bandwidth; Resiliency and Software Assurance Modification (RSAM); Counter Rocket Artillery and Mortar (C-RAM), Low Slow Small, Unmanned Aircraft Systems, Cruise Missiles; and Mode S.

Sentinel System of Systems (Sentinel A3): The Sentinel Product Office will contract with Raytheon for risk reduction efforts in the development of the software package to support the identification and engagement of Low Slow Small target sets. The Sentinel Product Office will work with Other Government Agencies to finalize integration and test of the IAMD B Kit on board the Sentinel platform and to add simulation capability to allow a high fidelity representation of Sentinel to IAMD.

For the Sentinel A4 modification, Lockheed Martin was competitively awarded a Fixed Price Incentive Fee (FPIF) contract to develop a modified Sentinel with a new Active Electronically Scanned Array (AESA) antenna.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / Radar Development	Project (Number/Name) E10 / Sentinel
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Support	Various	Various : Multiple	5.651	2.843	Nov 2018	3.580	Nov 2019	4.592	Nov 2020	-		4.592	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		4.347		-		-		-	0.000	4.347	-
Subtotal			5.651	2.843		7.927		4.592		-		4.592	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Sentinel A3 Modifications	Various	Raytheon & Various : Fullerton, CA / Various	11.436	-		-		-		-		-	0.000	11.436	-
Electronic Attack/ Electronic Protect	Various	Raytheon & Various : Fullerton, CA / Various	15.316	6.186	Jan 2019	4.924	Jan 2020	5.313	Jan 2021	-		5.313	Continuing	Continuing	-
Active Electronically Scanned Array (A4)	C/FPIF	Lockheed Martin & Cruise Missile Defense Systems : Syracuse, NY and Huntsville, AL	18.804	20.213	Sep 2019	75.228	May 2020	95.160	Jan 2021	-		95.160	Continuing	Continuing	-
Mode S	Various	Raytheon & Various : Fullerton, CA / Various	1.838	5.134	Jan 2019	0.452	Jan 2020	-		-		-	0.000	7.424	-
Resiliency and Software Assurance Modification (RSAM) upgrade	Various	Raytheon & Various : Fullerton, CA / Various	-	-		1.774	Jan 2020	-		-		-	0.000	1.774	-
Counter Rocket Artillery and Mortars	Various	Raytheon & Various : Fullerton, CA / Various	-	-		3.306	Jan 2020	1.195	Jan 2021	-		1.195	Continuing	Continuing	-
Subtotal			47.394	31.533		85.684		101.668		-		101.668	Continuing	Continuing	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / Radar Development	Project (Number/Name) E10 / Sentinel
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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
Electronic Attack/Electronic Protect (EA/EP)																												
Mode S																												
Resiliency and Software Assurance Modification (RSAM) upgrade																												
Active Electronically Scanned Array (AESA) (A4)																												
Counter Rocket Artillery and Mortars																												

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>	Project (Number/Name) E10 / <i>Sentinel</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Battle Space Improvement	4	2012	4	2015
Stop, Stare and Track (SS&T)	4	2012	4	2015
Cross Domain Solution (CDS) Network Interface / Cyber Security	2	2015	4	2016
Electronic Attack/Electronic Protect (EA/EP)	2	2015	4	2033
Signal Data Processor (SDP) / North Finding Module (NFM)	2	2015	4	2017
Medium Bandwidth	2	2016	4	2018
System of Systems	2	2018	4	2018
Mode S	2	2018	4	2020
Resiliency and Software Assurance Modification (RSAM) upgrade	4	2019	4	2020
Active Electronically Scanned Array (AESA) (A4)	1	2017	4	2033
Counter Rocket Artillery and Mortars	2	2020	4	2021

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</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	-	35.468	42.883	21.201	-	21.201	14.804	10.149	6.212	6.255	0.000	136.972
DV6: <i>General Fund Enterprise Business System</i>	-	33.965	35.782	5.099	-	5.099	2.072	2.113	2.155	2.198	0.000	83.384
GF5: <i>General Fund Enterprise Business System</i>	-	1.503	7.101	16.102	-	16.102	12.732	8.036	4.057	4.057	0.000	53.588

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, applying to the General Fund Enterprise Business System (GFEBS). GFEBS is currently in Phase 5, Capability Support.

A. Mission Description and Budget Item Justification

DV6 - General Fund Enterprise Business System-Sensitive Activities (GFEBS-SA): GFEBS-SA is a designated National Security System (NSS) leveraging the GFEBS base system as the Army's core financial management system certified by the Chief Financial Officers Council. To protect sensitive information and enable clean auditability, the Army requires a separate instance of GFEBS operated on a secure network for processing sensitive and classified financial transactions that cannot be processed in the fully-fielded GFEBS base system without compromising classified information or missions, or endangering soldiers. Therefore, GFEBS-SA is an essential financial program designed to enable the auditability that is needed to comply with the Chief Financial Officers (CFO) Act, the Federal Financial Management Improvement Act (FFMIA), and prevent compromise of data that could cause grave harm to U.S. forces. GFEBS-SA is envisioned as a fully functional GFEBS application operated on a secure network (SIPR), leveraging off of the sustained system design while providing additional implementation that includes additional requirements designed to protect sensitive intelligence operations and special operations missions. It will process Secret Collateral and below information while providing GFEBS capabilities such as distribution and execution of appropriated funds, cost management, financial reporting, and asset management. GFEBS-SA will be implemented and deployed to 3,000 users across 100 locations worldwide. GFEBS-SA will support information exchanges with organizations that support the Army's sensitive activities mission, including cross-security domain integration between SIPR and NIPR with GFEBS and other system partners. Services will be capable of being upgraded throughout the life of the program in order to incorporate advances in best business practices and technology, and will modify capability to maintain a synchronized software baseline with the GFEBS base system to maintain efficiencies in capability enhancements, training documentation, and sustainment support. In FY 2021 the GFEBS-SA system will reach Full Deployment and the RDTE funding requested will complete system upgrades and enhancements which will re-synchronize the system baseline with the GFEBS base system to account for any capability upgrades that were made to the base system while GFEBS-SA was in development.

GF5 - General Fund Enterprise Business System (GFEBS): GFEBS is the Army's core financial management system for administering its General Fund. Full Deployment was reached in 2012 and the system is currently in the Capability Support (sustainment) phase of the Business Acquisition Cycle, focused on modernization, cyber security, and system enhancements while also conducting capability enhancements to meet policy and deliver a more accurate picture of Army financial awareness. GFEBS was implemented to fulfill the needs and enable the Army to comply with the Federal Financial Management. GFEBS was developed using

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>
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a commercial off-the-shelf Enterprise Resource Planning system that is certified by the Chief, Financial Officer Council and provides six core financial functions (United States General Ledger (USGL), Cost Management, Funds Control, Payable Management, Real Property, Receivable Management and Reports). GFEBS required RDTE funding for FY 2021 is to provide capability enhancements designed to meet Yellow Book audit readiness standards, and continue to make system changes as prioritized by the functional sponsor and user community through the Process Owners Group, a Senior Executive Service/General Officer-level board. The RDTE funding will support the additional focus on completing system enhancements which enable an audit-ready Army, ensure a modern and sustainable system, and enable the retirement of legacy systems freeing up funding for investment into the modern ERP; as well as modernization efforts aligned with the Original Equipment Manufacturer's (SAP) next generation capability.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	36.810	46.683	28.725	-	28.725
Current President's Budget	35.468	42.883	21.201	-	21.201
Total Adjustments	-1.342	-3.800	-7.524	-	-7.524
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-3.800			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.342	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-7.524	-	-7.524

Change Summary Explanation

For FY 2021, the overall change is a result of changes to each of the child funding lines within the GFEBS Program Element.

GFEBS-SA (DV6) decreased in FY 2021 in the new President's Budget based on the accelerated timeline set forth by the Vice Chief of Staff of the Army. The schedule acceleration moves Full Deployment forward from its original FY 2021 scheduled date which decreases the RDTE request in FY 2021; leaving only the amount needed to provide enhancements which re-synchronize the system's baseline.

GFEBS (GF5) increased in FY 2021 in the new President's Budget based on the additional focus on completing the audit-related system enhancements which will give the Army an auditable financial system. The GFEBS Process Owners Group and Functional Governance Board have developed a list of enhancement items and have put the highest priority on those items which enable an audit-ready Army, ensure a modern and sustainable system, and enable the retirement of legacy systems freeing up funding for investment into the modern ERPs. Specifically, the additional enhancements will improve the Army's fund balance with Treasury reducing service provider personnel needed to support reconciliation activities. This allows the Army to focus resources on mission critical activities. The increased funding also supports modernization efforts aligned with the Original Equipment Manufacturer (SAP) next generation capability. The modernization activities include code de-customization, data enablement, and improved automated data access to prevent end of support for the current database and platform.

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

Appropriation/Budget Activity
2040: *Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)*

R-1 Program Element (Number/Name)
PE 0604822A / *General Fund Enterprise Business System (GFEBS)*

Funds will also support acquisition trades and market research on alternatives for SAP based finance/logistics consolidation to evaluate potential efficiencies by reducing platforms and licenses.

A congressional mark of \$3.8 million was placed on FY2020 RDTE in the GFEBS (GF5) line due to GFEBS prior year carryover.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)				Project (Number/Name) DV6 / General Fund Enterprise Business 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
DV6: General Fund Enterprise Business System	-	33.965	35.782	5.099	-	5.099	2.072	2.113	2.155	2.198	0.000	83.384
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
Project DV6 is for General Fund Enterprise Business System - Sensitive Activities (GFEBS-SA).

A. Mission Description and Budget Item Justification

DV6 - General Fund Enterprise Business System-Sensitive Activities (GFEBS-SA): GFEBS-SA is a designated National Security System (NSS) leveraging the GFEBS base system as the Army's core financial management system certified by the Chief Financial Officers Council. To protect sensitive information and enable clean auditability, the Army requires a separate instance of GFEBS operated on a secure network for processing sensitive and classified financial transactions that cannot be processed in the fully-fielded GFEBS base system without compromising classified information or missions, or endangering soldiers. Therefore, GFEBS-SA is an essential financial program designed to enable the auditability that is needed to comply with the Chief Financial Officers (CFO) Act, the Federal Financial Management Improvement Act (FFMIA), and prevent compromise of data that could cause grave harm to U.S. forces. GFEBS-SA is envisioned as a fully functional GFEBS application operated on a secure network (SIPR), leveraging off of the sustained system design while providing additional implementation that includes additional requirements designed to protect sensitive intelligence operations and special operations missions. It will process Secret Collateral and below information while providing GFEBS capabilities such as distribution and execution of appropriated funds, cost management, financial reporting, and asset management. GFEBS-SA will be implemented and deployed to 3,000 users across 100 locations worldwide. GFEBS-SA will support information exchanges with organizations that support the Army's sensitive activities mission, including cross-security domain integration between SIPR and NIPR with GFEBS and other system partners. Services will be capable of being upgraded throughout the life of the program in order to incorporate advances in best business practices and technology, and will modify capability to maintain a synchronized software baseline with the GFEBS base system to maintain efficiencies in capability enhancements, training documentation, and sustainment support.

In FY 2021 the GFEBS-SA system will reach Full Deployment and the RDTE funding requested will complete system upgrades and enhancements which will re-synchronize the system baseline with the GFEBS base system to account for any capability upgrades that were made to the base system while GFEBS-SA was in development.

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

Title: Software Development	FY 2019	FY 2020	FY 2021
Description: Software development includes all RDTE activities related to the development of the GFEBS-SA system itself. This includes the systems engineering management, planning, and blueprinting as well as the system integrator putting hands on keyboards to integrate the GFEBS solution into the Secret (SIPR) environment to include developing the required interfaces to allow GFEBS-SA to interact with partner systems; and the hardware and software tools necessary to facilitate development. After	17.741	17.531	5.099

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>	Project (Number/Name) DV6 / <i>General Fund Enterprise Business System</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
<p>Full Deployment occurs in FY 2021, RDTE funding is required to allow the GFEBS-SA system capability to remain synchronized with the base GFEBS system.</p> <p>FY 2020 Plans: During FY 2020, the program will enter the final stages of testing and deployment of the system. The RDT&E funding will include costs for the final delivery of the GFEBS-SA solution, the systems engineering management to finalize and deliver updated system documentation following developmental/operational testing, and the completion of all cybersecurity processes in order to receive Authority to Operate. Note that since the FY20 submission the integration testing with major data systems was delayed for 45 days due to a waiver requirements for non-Treasury Disbursing Office compliance in accordance with OUSD(C) policy. This has pushed the Full Deployment date back into 1QFY2021; however, all previously planned FY 2020 development/operational testing and deployment activities are still planned to occur.</p> <p>FY 2021 Plans: In FY 2021 the GFEBS-SA system will reach Full Deployment and the RDTE funding requested will complete system upgrades and enhancements which will re-synchronize the system baseline with the GFEBS base system to account for any capability upgrades and platform modernization that were made to the base system while GFEBS-SA was in deployment. This synchronization allows GFEBS to remain on-track in meeting Congressionally-mandated auditability requirements. Additionally, funds support efforts to integrate sensitive activity capability across the Enterprise.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The decrease in funding from FY 2020 to FY 2021 is due to the system reaching Full Deployment in 1QFY2021 resulting in the completion of design, development, and testing. The remaining RDTE funds are used to complete system upgrades and enhancements which will re-synchronize the system baseline with the GFEBS base system to account for any capability upgrades or functional updates that were made to the base system while GFEBS-SA was in development.</p>				
<p>Title: Testing</p> <p>Description: Testing includes all efforts related to test planning, Developmental Testing (DT), User Acceptance Testing (UAT), Operational Test & Evaluation (OT&E), and the system integrator labor and site services aligned with each.</p> <p>FY 2020 Plans: During FY 2020, User Acceptance Testing and Developmental Testing will occur prior to and post IOC. These costs support the Government Test requirements with the Joint Interoperability Test Command (JITC) and the Army Test and Evaluation Command (ATEC) as well as ensuring the System Integrators and Command Test Operators are available to support.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>		0.960	3.982	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)	Project (Number/Name) DV6 / General Fund Enterprise Business System		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
All testing events will have been scheduled and funded by the end of FY 2020, therefore there is no testing funding necessary in FY 2021.				
<p>Title: Program Support</p> <p>Description: Program Support includes program management and training activities. Costs include government management and travel, facilities, and development of recurring training materials.</p> <p>FY 2020 Plans: Program support costs in FY 2020 includes Program Management Office personnel providing non-technical support (acquisition, operations, financial, logistics, etc.), organizational change management planning and execution of site visits to communicate the Army auditability objectives mission and purpose to partner commands, and the development of recurring training tools.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The GFEBS-SA system will be fully deployed in FY 2021, therefore program support funding will be requested to be paid with OMA immediately upon reaching the Capability Support Authorization to Proceed (ATP) in accordance with DoDI 5000.75.</p>		6.664	3.309	-
<p>Title: Data Center Hosting</p> <p>Description: Data center hosting includes all costs associated with hosting of each environment in the Cloud; which include pre-development, staging, production, continuity of operations (COOP), Quality Assurance, and program management tools. Other resources included in these costs are HANA, the cross-domain investment, and the SIPR circuit Attribute Based Access Control (ABAC) data hosting.</p> <p>FY 2020 Plans: By the end of FY 2020, GFEBS-SA will be fully operational on each hosting environment in preparation for system deployment to all sites.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: The GFEBS-SA system will be fully deployed in FY 2021, therefore data center hosting funding will be requested to be paid with OMA immediately upon reaching the Capability Support Authorization to Proceed (ATP) in accordance with DoDI 5000.75.</p>		8.600	9.336	-
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>		-	1.624	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)	Project (Number/Name) DV6 / General Fund Enterprise Business System
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	33.965	35.782	5.099

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
• B55511: GFEBS SENSITIVE ACTIVITIES	6.424	11.248	0.000	-	0.000	-	-	-	-	0.000	17.672

Remarks

GFEBS-SA will be fully deployed in FY 2021; therefore, there are no procurement dollars budgeted in the GFEBS-SA line for FY 2021 and beyond. GFEBS base program procurement dollars will be used to prevent end of service life by the Original Equipment Manufacturer, SAP, and enable a migration of the GFEBS-SA database from Oracle to SAP as part of the synchronization between GFEBS and GFEBS-SA in FY2021. Additionally, procurement funds will be leveraged to support deployments in conjunction with GFEBS-SA Full Deployment schedule to sites not currently running the GFEBS base system.

GFEBS-SA OMA requirements begin in FY 2021, which is the scheduled Full Deployment date. These requirements will be incorporated into the GFEBS base system Future Years Defense Program (FYDP) request.

D. Acquisition Strategy

Plan, develop, and manage GFEBS-SA as a separate instance from GFEBS base program on the SIPRNet to support delivery of capabilities for this designated National Security System (NSS) in support of the sensitive activity commands. The GFEBS-SA solution was acquired as a sole source contract with Accenture Federal Services as a single increment. The contract is a hybrid of Firm Fixed Price and Cost Plus Fixed Fee CLINs to support development efforts and to encourage Accenture Federal Services to deliver a solution in support of the Vice Chief of Staff of the Army recommendation to accelerate the schedule to ensure operational security and Army audit requirements. The contract was awarded in April 2017.

Software is being developed through a single build to achieve full capability. GFEBS-SA will consist of a single software release delivered in a limited deployment to the Initial Operational Test and Evaluation (IOT&E) unit, followed by a full deployment to all other users upon successful completion of IOT&E.

The program will require modernization enhancements after full deployment. These modernization enhancements will require a stream of RDT&E funding to keep the GFEBS-SA system synchronized with the base system by making modifications needed for audit readiness, compliance, and upgrades required to keep the system up-to-date with SAP standards and Functional Governance Board requirements.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)	Project (Number/Name) DV6 / General Fund Enterprise Business System
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.624		-		-		-	0.000	1.624	-
Subtotal			-	-		1.624		-		-		-	0.000	1.624	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	SS/ Various	Accenture Federal LLC : Alexandria, VA	35.938	17.741	Oct 2018	17.531	Mar 2020	5.099	Oct 2020	-		5.099	20.227	96.536	88.300
Data Center Hosting	TBD	Defense Information Systems Agency : Ft. Meade, MD	7.487	8.600	Oct 2018	9.336	Oct 2019	-		-		-	0.000	25.423	-
Subtotal			43.425	26.341		26.867		5.099		-		5.099	20.227	121.959	N/A

Remarks
 The current contract is a hybrid of FFP, CPFF, and CR CLINs for system development, landscape configuration, test and evaluation, solution delivery, and certification/ accreditation.
 Cost to Complete assumes a service life through FY 2030. Some of this support will take place on a follow-on contract.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support Costs	Various	PdM GFEBS SA : Arlington, VA	20.044	6.664	Oct 2018	3.309	Oct 2019	-		-		-	0.000	30.017	-
Subtotal			20.044	6.664		3.309		-		-		-	0.000	30.017	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)	Project (Number/Name) DV6 / General Fund Enterprise Business 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				
Program Management																																
Program Support (RDTE)																																
Data Center Hosting																																
Data Center Hosting (RDTE)																																
Software Development																																
Software Development (RDTE)																																
Testing																																
Testing (RDTE)																																
Milestone B (ATP 3)																																
Initial Operating Capability (IOC)																																
Full Deployment (FD)																																
License Procurement																																
License Procurement (OPA)																																
Deployment																																
Deployment (OPA)																																
Initial Re-synchronization w/ GFEBS Baseline																																
Initial Re-synchronization w/ GFEBS Baseline (RDTE)																																
Modernization Enhancements																																
Continuous Process & Product Improvements (RDTE)																																
Capability Support (Sustainment)																																
Capability Support (OMA)																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>	Project (Number/Name) DV6 / <i>General Fund Enterprise Business System</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Program Management	2	2017	1	2021
Data Center Hosting	1	2019	1	2021
Software Development	3	2017	3	2019
Testing	3	2019	4	2020
Milestone B (ATP 3)	4	2019	4	2019
Initial Operating Capability (IOC)	2	2020	2	2020
Full Deployment (FD)	1	2021	1	2021
License Procurement	1	2019	2	2020
Deployment	2	2020	1	2021
Initial Re-synchronization w/ GFEBS Baseline	1	2021	3	2021
Modernization Enhancements	1	2021	4	2025
Capability Support (Sustainment)	1	2021	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBs)				Project (Number/Name) GF5 / General Fund Enterprise Business 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
GF5: General Fund Enterprise Business System	-	1.503	7.101	16.102	-	16.102	12.732	8.036	4.057	4.057	0.000	53.588
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

GF5 - General Fund Enterprise Business System (GFEBs): GFEBs is the Army's core financial management system for administering its General Fund. Full Deployment was reached in 2012 and the system is currently in the Capability Support (sustainment) phase of the Business Acquisition Cycle, focused on modernization, cyber security, and system enhancements while also conducting capability enhancements to meet policy and deliver a more accurate picture of Army financial awareness. GFEBs was implemented to fulfill the needs and enable the Army to comply with the Federal Financial Management. GFEBs was developed using a commercial off-the-shelf Enterprise Resource Planning system that is certified by the Chief, Financial Officer Council and provides six core financial functions (United States General Ledger (USGL), Cost Management, Funds Control, Payable Management, Real Property, Receivable Management and Reports).

GFEBs RDTE funding in FY 2021 will support the additional focus on completing the audit-related system enhancements which will give the Army an auditable financial system designed to meet Yellow Book audit readiness standards as outlined by the United States Government Accountability Office, as well as support the continuation of system changes as prioritized by the functional sponsor and user community through the Process Owners Group, a Senior Executive Service/General Officer-level board. The GFEBs Process Owners Group and Functional Governance Board have developed a list of enhancement items and have put the highest priority on those items which enable an audit-ready Army, ensure a modern and sustainable system, and enable the retirement of legacy systems freeing up funding for investment into the modern ERPs. Specifically, the additional enhancements will improve the Army's fund balance with Treasury reducing service provider personnel needed to support reconciliation activities. This allows the Army to focus resources on mission critical activities. The funding also supports modernization efforts aligned with the Original Equipment Manufacturer's (SAP) next generation capability. The modernization activities include code de-customization, data enablement, and improved automated data access to prevent end of support for the current database and platform. Funds will also support acquisition trades and market research on alternatives for SAP based finance/logistics consolidation to evaluate potential efficiencies by reducing platforms and licenses.

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

	FY 2019	FY 2020	FY 2021
Title: Capability Enhancement	1.503	6.779	16.102
Description: Capability enhancements provide changes to the system that are needed to update the infrastructure as required to meet SAP requirements and best practices, and to support evolving statutory and regulatory requirements. The capability enhancement initiatives are needed to increase the GFEBs capability and performance to maintain compliance with Federal Financial Management Improvement Act (FFMIA), Business Enterprise Agency (BEA), Standard Financial Information Structure (SFIS) requirements, and Yellow Book auditability. These requirements are established and prioritized through a General Officer (GO)/Senior Executive Service (SES)-level Process Owners Group and Functional Governance Board.			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>	Project (Number/Name) GF5 / <i>General Fund Enterprise Business System</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<p><i>FY 2020 Plans:</i> FY 2020 RDT&E funding will be used to perform system enhancements/upgrades as requested by the Process Owners Group and Functional Governance Board. With increased focus on making the Army auditable, many of these upgrades are aligned with the auditability of GFEBS and have been highly prioritized. The focus for enhancements funded with RDT&E during FY 2020 will be on these audit-related enhancements. Note that the program received a \$3.8 million congressional mark which reduces the ability to complete all but two of the previously planned system enhancements.</p> <p><i>FY 2021 Plans:</i> The RDTE funds requested in FY 2021 support the additional focus on completing the audit-related system enhancements which will give the Army an auditable financial system designed to meet Yellow Book audit readiness standards as outlined by the United States Government Accountability Office, as well as support the continuation of system changes as prioritized by the functional sponsor and user community through the Process Owners Group, a Senior Executive Service/General Officer-level board. The GFEBS Process Owners Group and Functional Governance Board have developed a list of enhancement items and have put the highest priority on those items which enable an audit-ready Army, ensure a modern and sustainable system, and enable the retirement of legacy systems freeing up funding for investment into the modern ERPs. Specifically, the additional enhancements will improve the Army's fund balance with Treasury reducing service provider personnel needed to support reconciliation activities. This allows the Army to focus resources on mission critical activities. The funding also supports modernization efforts aligned with the Original Equipment Manufacturer's (SAP) next generation capability. The modernization activities include code de-customization, data enablement, and improved automated data access to prevent end of support for the current database and platform. Funds will also support acquisition trades and market research on alternatives for SAP based finance/logistics consolidation to evaluate potential efficiencies by reducing platforms and licenses.</p> <p><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> RDTE funding has increased from FY 2020 to FY 2021 based on the additional focus of completing the audit-related system enhancements which will give the Army an auditable financial system designed to meet Yellow Book audit readiness standards as outlined by the United States Government Accountability Office. The GFEBS Process Owners Group and Functional Governance Board have developed a list of enhancement items and have put the highest priority on those items which enable an audit-ready Army, ensure a modern and sustainable system, and enable the retirement of legacy systems freeing up funding for investment into the modern ERPs. Specifically, the additional enhancements will improve the Army's fund balance with Treasury reducing service provider personnel needed to support reconciliation activities. This allows the Army to focus resources on mission critical activities. The increased funding also supports modernization efforts aligned with the Original Equipment Manufacturer's (SAP) next generation capability. The modernization activities include code de-customization, data enablement, and improved automated data access to prevent end of support for the current database and platform. Funds will also support acquisition trades</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBs)</i>	Project (Number/Name) GF5 / <i>General Fund Enterprise Business System</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
and market research on alternatives for SAP based finance/logistics consolidation to evaluate potential efficiencies by reducing platforms and licenses.			
Title: FY 2020 SBIR/STTR Transfer	-	0.322	-
Description: Funding transferred in accordance with Title 15 USC ?638			
FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638			
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	1.503	7.101	16.102

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
• BE4168: <i>General Fund Enterprise Business System</i>	4.552	3.754	4.448	-	4.448	4.566	-	-	-	0.000	17.320
• OMA - ERPE-ERPA / 438001000 / 5T0: <i>GFEBs OMA</i>	99.176	-	0.000	-	0.000	-	-	-	-	0.000	99.176

Remarks

OPA - FY 2021 Procurement dollars in the amount of \$4.448 million supports software and hardware infrastructure upgrades to bring GFEBs reporting and analytics in-line with processing performance thresholds established in the GFEBs Capabilities Production Document (CPD). Software upgrades support auditability requirements as well as the compliance of the system's required software standards. GFEBs base program procurement dollars will be used to prevent end of service life by the Original Equipment Manufacturer, SAP, and enable a migration of the GFEBs-SA database from Oracle to SAP as part of the synchronization between GFEBs and GFEBs-SA in FY 2021. Additionally, procurement funds will be leveraged to support deployments in conjunction with GFEBs-SA Full Deployment schedule to sites not currently running the GFEBs base system.

OMA - [P&R Form System does not show amounts for FY 2020 through FY 2025] FY 2021 and beyond OMA dollars include funding for both GFEBs and GFEBs-SA programs. OMA-funded support includes data center hosting, software/hardware maintenance, capability support, and capability enhancements.

D. Acquisition Strategy

GFEBs is currently in the Capability Support (sustainment) phase as specified in DoDI 5000.75. On 15 January 2018, the responsibility for system support of the GFEBs system transitioned from the original developer contract to a contract created to focus more on sustainment support and cost control. The current sustainment

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>	Project (Number/Name) GF5 / <i>General Fund Enterprise Business System</i>

contract provides specific contracting methodologies to track all capability support functions as well as all the system enhancement requirements as set forth by the user community through the Process Owners Group; a Senior Executive Service/General Officer-level board that prioritizes user needs. Many of these enhancements require RDT&E funding as determined through a set of established business rules.

The next step on the program's contracting strategy includes a transition of all Capability Support functions to the Army Shared Services Center, and the transition of all prioritized system enhancements to a Portfolio follow-on contract supporting enhancements for the GFEBS and GFEBS-SA systems which allows the programs to realize efficiencies through a "build once, deploy twice" development strategy.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)	Project (Number/Name) GF5 / General Fund Enterprise Business System
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.322		-		-		-	0.000	0.322	-
Subtotal			-	-		0.322		-		-		-	0.000	0.322	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Development	Option/ Various	IBM Corp : Bathesda, Maryland	130.569	1.503		6.779	Jan 2020	16.102	Nov 2020	-		16.102	Continuing	Continuing	185.769
Subtotal			130.569	1.503		6.779		16.102		-		16.102	Continuing	Continuing	N/A

Remarks
Total value of contract includes capability support (OMA) and enhancement services through January 15, 2023.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	130.569	1.503	7.101	16.102	-	16.102	Continuing	Continuing	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)	Project (Number/Name) GF5 / General Fund Enterprise Business System

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Map/Blueprint/Build Release 1.1	4	2005	3	2006
MS B1	1	2008	1	2008
Realization - Release 1.2	4	2006	1	2009
IOC	3	2009	3	2009
Release 1.3 - Replace STANFINS	1	2008	1	2011
Full Deployment Decision Review	3	2009	3	2009
Release 1.4: Replace SOMARDS	4	2008	1	2011
Full Deployment Decision Review 2	1	2010	1	2010
Hardware Fielding	1	2009	1	2011
Full Deployment	4	2012	4	2012
Sustainment Contract w/ Capability Enhancement Task Order (Current)	2	2018	2	2022
Army Shared Services Sustainment w/ Capability Enhancement Option (Follow-on)	2	2022	4	2025
Capability Enhancements FY18	1	2018	4	2018
System Enhancements FY19	1	2019	4	2019
System Enhancements FY20	1	2020	4	2020
System Enhancements & SAP Modernization FY21	1	2021	4	2021
System Enhancements & SAP Modernization FY22	1	2022	4	2022
System Enhancements & SAP Modernization FY23	1	2023	4	2023
System Enhancements & SAP Modernization FY24	1	2024	4	2024
System Enhancements & SAP Modernization FY25	1	2025	4	2025

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</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	-	25.856	17.294	20.008	-	20.008	11.717	12.867	14.584	13.356	Continuing	Continuing
L86: <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>	-	4.036	4.913	5.375	-	5.375	2.764	3.427	4.553	4.844	Continuing	Continuing
L87: <i>Hypervelocity Armament System (HAS)</i>	-	16.373	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	16.373
L88: <i>Enhanced AN/TPQ 36</i>	-	5.447	12.381	14.633	-	14.633	8.953	9.440	10.031	8.512	Continuing	Continuing

A. Mission Description and Budget Item Justification

The RDT&E funds for the AN/TPQ-50 and AN/TPQ-53 programs fund the design, development and test of primary efforts. The programs directly support the prioritization, tracking and locating of targets, and dissemination of that information for simultaneous attack of multiple threats. They provide the Warfighter with continuous and responsive counterfire target acquisition systems for all types and phases of military operations. Project L86, Lightweight Counter Mortar Radar (LCMR), version AN/TPQ-50 provides 360 degrees of azimuth coverage from ranges of 500 meters to 10 kilometers. Project L88, AN/TPQ-53 is a highly mobile radar system that leverages the latest in technology design to accelerate modernization and increase range while improving false location rate, reducing obsolescence and increasing reliability. The AN/TPQ-53 provides a system with increased range and accuracy throughout a 90 degree search sector (stare mode) as well as 360 degree coverage (rotating) for locating mortar, artillery and rocket firing positions. The AN/TPQ-50 and AN/TPQ-53 radars are currently fielded to multiple Continental United States (CONUS) and Outside Continental United States (OCONUS) locations to include operational support to Operation Inherent Resolve (OIR) and Operation Freedom's Sentinel (OFS).

The Fiscal Year (FY) 2021 Base funding in the amount of \$20.008 million supports ongoing AN/TPQ-50 and AN/TPQ-53 test efforts, Army interoperability certifications (AICs), and the development and testing of modernization efforts to address extended range, electronic protection, and emerging threats in support of multi-domain operations against peer and near-peer threats. These efforts include the performance of technical assessments, engineering studies, risk reduction, and required documentation.

This program line also funds development of an integrated Hypervelocity Armament System (HAS), and associated technologies as they mature to support accelerated demonstration and transition of advanced gun weapon systems, command guided maneuverable projectiles, and tactical sensors. The development of HAS would include advancing artillery powder guns firing Hypervelocity Projectiles (HVPs), resulting in next-generation, common, low drag, guided cannon artillery projectiles capable of completing multiple missions with improved cost effectiveness across different gun systems. Integration with a fire control radar and sensor array will allow closed-loop targeting of moving and relocatable targets beyond the range of conventional artillery.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	27.439	17.294	20.026	-	20.026
Current President's Budget	25.856	17.294	20.008	-	20.008
Total Adjustments	-1.583	0.000	-0.018	-	-0.018
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.583	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.018	-	-0.018

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>				Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</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
L86: <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>	-	4.036	4.913	5.375	-	5.375	2.764	3.427	4.553	4.844	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The AN/TPQ-50 Lightweight Counter Mortar Radar (LCMR) is a highly mobile radar that automatically detects, classifies, tracks, and locates the point of origin of projectiles fired from mortar, artillery, and rocket systems with sufficient accuracy for first round fire for effect. It mitigates close combat radar coverage gaps by providing 360 degrees of azimuth coverage from ranges of 500 meters to 10 kilometers and is capable of being deployed in two configurations, standalone or vehicle mounted. The AN/TPQ-50 system interoperates with mission command systems to provide the maneuver commander increased counterfire radar flexibility. The AN/TPQ-50 is deployed as part of the Counter-Rocket, Artillery, Mortar (C-RAM) system of systems. It provides data to the Forward Area Air Defense Command and Control (FAAD C2) node for the sense and warn force protection capability. The AN/TPQ-50 is currently fielded to multiple Continental United States (CONUS) and Outside Continental United States (OCONUS) locations to include support to Operation Inherent Resolve (OIR) and Operation Freedom's Sentinel (OFS).

The fiscal year (FY) 2021 funds of \$5.375 million continue development required to address electronic protection against cyber electromagnetic activity (CEMA) and threats identified in the Validated Online Lifecycle Threat (VOLT) report. This funding enables the program to develop and integrate sensor protect capabilities into the software baseline, develop advanced protection techniques which take advantage of hardware upgrades, and develop documentation for hardware and software capability improvements in support of multi-domain operations against peer and near-peer threats. Funding supports associated test costs and program support.

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

	FY 2019	FY 2020	FY 2021
Title: Modernization & Emerging Threats	4.036	4.690	5.375
Description: Funding supports software updates required to address electronic protection and mitigate the effects of electromagnetic interference (EMI) and combat cyber electromagnetic activity (CEMA). These capabilities address vulnerabilities identified in the bi-annual release of the Validated Online Lifecycle Threat (VOLT) and changes on the battlefield due to new tactics, techniques, and procedures (TTPs) and/or areas of operation.			
FY 2020 Plans: Funding enables the continuation of work required to enhance the AN/TPQ-50's capability to address electronic protection against cyber electromagnetic activity (CEMA) and other known, new, emerging and evolving threats identified in the Validated Online Lifecycle Threat (VOLT) report. In addition, it integrates developed capabilities into the baseline, develops documentation for hardware and software capability improvements, and includes operational assessments for capability improvements. Funding supports all associated testing costs and program support. These efforts are executed by the LCMR program.			
FY 2021 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Funding increases the scope of work required to enhance the AN/TPQ-50's ability to address electronic protection against CEMA and new threats identified in the VOLT report as well as associated test efforts and program support. These efforts are executed by the LCMR program. FY 2020 to FY 2021 Increase/Decrease Statement: Increase in funding reflects required development efforts to address threats identified in the VOLT report.			
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638	-	0.223	-
Accomplishments/Planned Programs Subtotals	4.036	4.913	5.375

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>
• B05201: <i>Lightweight Counter Mortar Radar</i>	6.107	5.400	5.332	-	5.332	6.520	5.762	9.888	12.788	Continuing	Continuing

Remarks

D. Acquisition Strategy

The AN/TPQ-50 Lightweight Counter Mortar Radar was developed in 2009 to meet Training and Doctrine Command (TRADOC) Capabilities Production Document (CPD) requirements. The program achieved a full rate production (FRP) decision on 21 June 2013. The AAO increased from 400 to 452 systems in January 2019; 400 systems procured to date. The AN/TPQ-50 program transitioned into the sustainment phase on 1 October 2019.

Research, Development, Test and Evaluation (RDT&E) funding supports modernization development task orders under the national maintenance contract (NMC). The efforts extend through the current Program Objective Memorandum (POM) period.

The fiscal year (FY) 2021 funds of \$4.303 million continue development required to address electronic protection against cyber electromagnetic activity (CEMA) and threats identified in the Validated Online Lifecycle Threat (VOLT) report. This funding enables the program to develop and integrate sensor protect capabilities into

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>

the software baseline, develop advanced protection techniques which take advantage of hardware upgrades, and develop documentation for hardware and software capability improvements in support of multi-domain operations to address peer and near-peer threats. Funding supports associated test costs and program support.

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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 / 5				PE 0604823A / Firefinder				L86 / LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)								
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Program Management (Government Support)	Various	Various : Activities	1.582	0.532	Nov 2018	0.495	Nov 2019	0.573	Oct 2020	-		0.573	Continuing	Continuing	Continuing	
Program Management (Contractor Support)	C/CPFF	Various : APG, MD	0.927	0.052	Mar 2019	-		-		-		-	Continuing	Continuing	Continuing	
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.223		-		-		-	0.000	0.223	-	
Subtotal			2.509	0.584		0.718		0.573		-		0.573	Continuing	Continuing	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	
Modernization & New and Emerging Threats	SS/CPFF	Various : Various	3.848	2.636	Oct 2018	2.744	Nov 2019	3.687	Nov 2020	-		3.687	Continuing	Continuing	Continuing	
Subtotal			3.848	2.636		2.744		3.687		-		3.687	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 Support (Government)	Various	Various : Activities	5.184	0.816	Nov 2018	1.451	Nov 2019	1.115	Nov 2020	-		1.115	Continuing	Continuing	Continuing	
Subtotal			5.184	0.816		1.451		1.115		-		1.115	Continuing	Continuing	N/A	
Project Cost Totals			11.541	4.036		4.913		5.375		-		5.375	Continuing	Continuing	N/A	
Remarks																

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</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
Modernization and Emerging Threats - Fiscal Year (FY) 2019 VOLT	████████████████																											
Modernization Testing - FY 2019 VOLT					████████████████																							
Modernization and Emerging Threats - FY 2021 VOLT									████████████████																			
Modernization Testing - FY 2021 VOLT													████████████████															
Modernization and Emerging Threats - FY 2023 VOLT																	████████████████											
Modernization Testing - FY 2023 VOLT																					████████████████							
Modernization and Emerging Threats - FY 2025 VOLT																									████████████████			

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Modernization and Emerging Threats - Fiscal Year (FY) 2019 VOLT	1	2019	1	2021
Modernization Testing - FY 2019 VOLT	1	2020	1	2022
Modernization and Emerging Threats - FY 2021 VOLT	1	2021	1	2023
Modernization Testing - FY 2021 VOLT	1	2022	1	2024
Modernization and Emerging Threats - FY 2023 VOLT	1	2023	1	2025
Modernization Testing - FY 2023 VOLT	1	2024	1	2026
Modernization and Emerging Threats - FY 2025 VOLT	1	2025	1	2027

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L87 / <i>Hypervelocity Armament System (HAS)</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
L87: <i>Hypervelocity Armament System (HAS)</i>	-	16.373	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	16.373
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Project L87 The Hypervelocity Armament System (HAS) and associated technologies are composed of advanced gun weapon systems, command guided maneuverable projectiles, and tactical sensors. The development of HAS would include advancing artillery powder guns firing Hypervelocity Projectiles (HVPs), resulting in a next generation, common, low drag, guided cannon artillery projectiles capable of completing multiple missions with improved cost effectiveness. Integration with a fire control radar and sensor array will allow closed-loop targeting of moving and relocatable targets beyond the range of conventional artillery.

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

	FY 2019	FY 2020	FY 2021
Title: Development	11.200	-	-
Description: Funding is provided for all development efforts on Hypervelocity Armament System (HAS) technology transitions.			
Title: Program Management	5.173	-	-
Description: Funding is provided for all program management efforts on Hypervelocity Armament System (HAS).			
Accomplishments/Planned Programs Subtotals	16.373	-	-

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

N/A

Remarks

D. Acquisition Strategy

The Army will leverage Strategic Capabilities Office (SCO) prototypes and technologies to continue transition from the FY 2018 program into programs of record.

The Army is transitioning prototype articles from the SCO demonstration to develop advanced gun systems, command guided maneuverable projectiles, and fire control sensors capable of engaging tactical range targets. Emerging requirements include communication suite changes, munitions updates, and introduction of new munitions require software and/or hardware updates to ensure full compatibility and maintain operational viability.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L87 / <i>Hypervelocity Armament System (HAS)</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
Hypervelocity Armament System Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L87 / <i>Hypervelocity Armament System (HAS)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Hypervelocity Armament System Development	1	2018	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>				Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</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
L88: <i>Enhanced AN/TPQ 36</i>	-	5.447	12.381	14.633	-	14.633	8.953	9.440	10.031	8.512	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Enhanced AN/TPQ-36 (AN/TPQ-53) Counterfire Target Acquisition Radar System is a highly mobile radar set that automatically detects, classifies, tracks, and locates the point of origin of projectiles fired from mortar, artillery, and rocket systems with sufficient accuracy for first round fire for effect. It mitigates close combat radar coverage gaps by providing a 90 degree search sector (stare mode) as well as 360 degree coverage (rotating) and replaces the current AN/TPQ-36 and AN/TPQ-37 Firefinder Radars. The AN/TPQ-53 system interoperates with mission command systems to provide the maneuver commander increased counterfire radar flexibility. The AN/TPQ-53 is deployed as part of the Counter-Rocket, Artillery, Mortar (C-RAM) system of systems. It provides data to the Forward Area Air Defense Command and Control (FAAD C2) node for the sense and warn force protection capability. The AN/TPQ-53 currently supports contingency operations to include Operation Inherent Resolve (OIR) and is fielded to Brigade Combat Teams (BCTs), Field Artillery Brigades (FABs) and Division Artilleries (DIVARTYs).

The FY 2021 funds of \$14.633 million supports ongoing test efforts, Army interoperability certifications (AICs), and the development and testing of modernization efforts to address extended range, electronic protection, and emerging threats in support of multi-domain operations against peer and near-peer threats. These efforts include the performance of technical assessments, engineering studies, risk reduction and required documentation.

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

	FY 2019	FY 2020	FY 2021
Title: Test support	1.111	4.062	10.346
Description: Funding supports testing efforts and associated Program Management Office (PMO) requirements.			
FY 2020 Plans: Conduct engineering and customer testing, Army interoperability certification (AIC) testing, a network vulnerability and penetration assessment, and electronic protection testing. Funds include associated PMO and test support costs. Funds will be executed by the Enhanced AN/TPQ-36 program.			
FY 2021 Plans: Conduct engineering testing and an independently evaluated, limited operational test in support of extended range efforts, Army interoperability certification (AIC) testing, a cooperative vulnerability and penetration assessment (CVPA), and electronic protection testing. Funds include associated PMO and test support costs. The Enhanced AN/TPQ-36 program will execute the funds.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Increase in FY 2021 cost due to operational test to demonstrate extended range capability using soldiers and further refinement of the software as required.			
<p>Title: Electronic Protection and Emerging Threats</p> <p>Description: This effort improves spectrum management and mitigates electromagnetic interference (EMI) from commercial and military bands. This effort also develops and improves radar electronic protection (EP) algorithms which counter electronic threats. Lastly, this effort funds the development of capabilities to address emerging threats identified in the biennial release of the Validated Online Lifecycle Threat (VOLT) report and changes on the battlefield due to new adversarial tactics, techniques, and procedures (TTPs) and/or areas of operation.</p> <p>FY 2020 Plans: Develop additional electronic protection techniques to mitigate cyber electromagnetic activity (CEMA). Continue development of capabilities to address emerging threats identified in the biannual release of the VOLT, changes in the battlefield and areas of operations. Implement tools and TTPs to allow the radar to operate more efficiently in the presence of electromagnetic interference (EMI). Funding supports associated developmental testing and program support. Funds will be executed by the Enhanced AN/TPQ-36 program.</p> <p>FY 2021 Plans: Continue development and testing of additional electronic protection techniques to mitigate cyber electromagnetic activity (CEMA) in peer and near peer threat environments. Continue development of capabilities to address emerging threats identified in the biennial release of the VOLT and conflict areas of operation. Implement tools and TTPs to allow the radar to operate more efficiently in the presence of electromagnetic interference (EMI). Funding supports associated developmental testing and program support. The Enhanced AN/TPQ-36 program will execute the funds.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase from FY 2020 to FY 2021 to support additional electronic protection development efforts associated with an updated distributed digital receiver exciter (DDREX).</p>	0.157	2.081	4.287
<p>Title: Extended Range</p> <p>Description: This effort extends the radar's detection and identification range through associated development, integration, and testing in support of the Army's number one modernization priority of long range precision fires (LRPF).</p> <p>FY 2020 Plans: Will conduct regression and live fire testing of the extended range capability. Implement design and software changes based on results from testing performed in an operationally representative environment. Integrate a proven extended range capability into</p>	4.179	5.675	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
the program's software baseline and conduct initial integration testing. These funds will be executed by the Enhanced AN/TPQ-36 program.			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Decrease in FY 2021 cost due to a reduction in scope of the extended range software development effort.			
<i>Title:</i> FY 2020 SBIR/STTR Transfer <i>Description:</i> Funding transferred in accordance with Title 15 USC ?638	-	0.563	-
<i>FY 2020 Plans:</i> Funding transferred in accordance with Title 15 USC ?638 <i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Funding transferred in accordance with Title 15 USC ?638			
Accomplishments/Planned Programs Subtotals	5.447	12.381	14.633

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>
• B05310: <i>AN/TPQ-53 Counterfire Target Acquisition Radar</i>	324.150	16.416	72.421	-	72.421	11.829	29.868	41.921	53.408	Continuing	Continuing

Remarks

D. Acquisition Strategy

The AN/TPQ-53 leverages technology developed in the multi-mission radar advanced technology objective (ATO) program. The system replaces all of the AN/TPQ-36 and AN/TPQ-37 systems in the fleet. The program obtained a Full Rate Production (FRP) decision in December 2015 and awarded an FRP contract in March 2017. The program will retrofit all initial production systems to the FRP configuration. The Army Acquisition Objective (AAO) increased from 174 to 189 systems in May 2017. Following the approval of a new acquisition category (ACAT) IC acquisition program baseline (APB) in April 2019, the program procured the last 15 FRP systems on contract in the same month. The program will complete all FRP system deliveries in FY 2021.

RDT&E funding supports modernization development and extended range software development task orders under the existing FRP contract. The efforts extend through the current Program Objective Memorandum (POM) period.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management (Government)	Various	Various : Various	2.153	0.397	Nov 2018	1.023	Oct 2019	1.114	Nov 2020	-		1.114	Continuing	Continuing	Continuing
Program Management (Contractor)	Various	Various : APG, MD	4.374	0.096	May 2019	0.035	May 2020	0.133	May 2021	-		0.133	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.563		-		-		-	0.000	0.563	-
Subtotal			6.527	0.493		1.621		1.247		-		1.247	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Electronic Protection and Emerging Threats	SS/FPIF	Lockheed Martin : Syracuse, NY	6.740	0.157	Dec 2018	2.175	Oct 2019	4.287	Oct 2020	-		4.287	Continuing	Continuing	Continuing
Extended Range	SS/FPIF	Lockheed Martin : Syracuse, NY	3.675	4.179	Jan 2019	5.769	Oct 2019	-		-		-	Continuing	Continuing	Continuing
Subtotal			10.415	4.336		7.944		4.287		-		4.287	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Support	SS/CPFF	Georgia Tech Research Institute (GTRI) : Atlanta, GA	1.361	0.300	Mar 2019	0.206	Mar 2020	0.336	Dec 2020	-		0.336	Continuing	Continuing	Continuing
Subtotal			1.361	0.300		0.206		0.336		-		0.336	Continuing	Continuing	N/A

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			
Test Support	Various	Various : Activities	53.884	0.318	Jan 2019	2.610	Oct 2019	8.763	Nov 2020	-		8.763	Continuing	Continuing	Continuing

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>
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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												
Extended Range (ER)																																								
ER Testing																																								
ER Limited Operational Test																																								
Ongoing Tests - Electronic Protection (EP) and Emerging Threat																																								
EP and Emerging Threats - Fiscal Year (FY) 2019 VOLT																																								
Modernization Testing - FY 2019 VOLT																																								
EP and Emerging Threats - FY 2021 VOLT																																								
Modernization Testing - FY 2021 VOLT																																								
EP and Emerging Threats - FY 2023 VOLT																																								
Modernization Testing - FY 2023 VOLT																																								
EP and Emerging Threats - FY 2025 VOLT																																								

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Extended Range (ER)	4	2018	4	2021
ER Testing	4	2019	2	2022
ER Limited Operational Test	3	2021	3	2021
Ongoing Tests - Electronic Protection (EP) and Emerging Threats	1	2016	2	2019
EP and Emerging Threats - Fiscal Year (FY) 2019 VOLT	2	2019	1	2021
Modernization Testing - FY 2019 VOLT	2	2020	1	2022
EP and Emerging Threats - FY 2021 VOLT	2	2021	1	2023
Modernization Testing - FY 2021 VOLT	2	2022	1	2024
EP and Emerging Threats - FY 2023 VOLT	2	2023	1	2025
Modernization Testing - FY 2023 VOLT	2	2024	1	2026
EP and Emerging Threats - FY 2025 VOLT	2	2025	1	2027