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 4

Army • Budget Estimates FY 2021 • RDT&E Program

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UNCLASSIFIED 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.

UNCLASSIFIED 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.

Budget Activity	OSDPE / Project	Project Title
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

New Start Programs:

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:

Budget		
<u>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 Meterological 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):

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

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FY 2019

Research, Development, Test & Eval, Army

Total Research, Development, Test & Evaluation

FY 2020 Total Enacted (Base+Emerg+ 12,690,739 12,690,739 0000 FY 2020 OCO Enacted 147,304 147,304 FY 2020 Emergency FY 2020 Base Enacted 12,543,435 12,543,435 (Base + 0CO) 11,371,268 11,371,268

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

(Base + 0CO) 12,770,167 12,770,167 FY 2021 Total 182,824 182,824 FY 2021 Total Direct War and Enduring Costs 182,824 182,824 FY 2021 OCO for OCO for Base Requirements FY 2021 12,587,343 12,587,343 FY 2021 Base IIIIIIIIII

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Appropriation

Research, Development, Test & Eval, Army

Total Research, Development, Test & Evaluation

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Department of Defense FY 2021President'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 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 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 Defense FY 2021President's Budget Exhibit R-1 FY 2021 President's Budget Total Obligational Authority (Dollars in Thousands)

(Base + OCO) 61,012 3,983 463,359 1,338,260 925,670 922,881 1,203,590 3,424,128 3,297,623 2,073,881 46,445 386, 640 11,392,862 12,770,167 12,770,167 FY 2021 Total 2,000 2,520 5,137 182,824 75,342 76,942 103,582 182,824 97,825 2,300 FY 2021 Total 000 and Enduring 2,000 2,520 Direct War 97,825 5,137 182,824 75,342 2,300 76,942 103,582 182,824 FY 2021 OCO for Costs OCO for Base Requirements FY 2021 3,983 923,370 12,587,343 463,359 920,881 1,203,590 3,421,608 309,698 11,289,280 61,012 3,199,798 1,333,123 1,998,539 46,445 12,587,343 FY 2021 Base otal Research, Development, Test & Evaluation Total Research, Development, Test & Evaluation Software and Digital Technology Pilot Programs Advanced Component Development & Prototypes Administration and Associated Activities Summary Recap of Budget Activities System Development & Demonstration Advanced Technology Development Operational Systems Development Intelligence and Communications Central Supply and Maintenance Summary Recap of FYDP Programs Research and Development General Purpose Forces Classified Programs Management Support Applied Research Basic Research Space

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Department of the Army FY 2021President'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 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted (Base+Emerg+ OCO)
Basic Research	491,263	574,484			574,484
Applied Research	1,553,764	1,259,374			1,259,374
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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			à)	
Space	209,281	285,952			285,952
Classified Programs	5,955	7,273			7,273
rotal Research, Development, Test & Evaluation	11,371,268	12,543,435		147,304	12,690,739

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

(Base + 0CO) 922,881 463,359 3,424,128 3,297,623 46,445 925,670 386,640 11, 392, 862 61,012 1,203,590 1,338,260 2,073,881 12,770,167 3,983 12,770,167 FY 2021 Total 2,520 97,825 2,300 182,824 103,582 182,824 2,000 5,137 75,342 76,942 FY 2021 Total 000 and Enduring 2,520 5,137 2,300 Direct War 97,825 2,000 76,942 103,582 182,824 75,342 182,824 FY 2021 OCO for Costs OCO for Base Requirements FY 2021 3,983 1,998,539 1,203,590 3,421,608 3,199,798 1, 333, 123 46,445 923,370 309,698 11,289,280 12,587,343 463,359 920,881 12,587,343 61,012 FY 2021 Base Total Research, Development, Test & Evaluation Total Research, Development, Test & Evaluation Software and Digital Technology Pilot Programs Advanced Component Development & Prototypes Administration and Associated Activities Summary Recap of Budget Activities System Development & Demonstration Intelligence and Communications Advanced Technology Development Operational Systems Development Central Supply and Maintenance Summary Recap of FYDP Programs Research and Development General Purpose Forces Classified Programs Management Support Applied Research Basic Research Space

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

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

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FY 2020 Total Enacted (Base+Emerg+ OCO)		354,480	87,858	127,164	4,982	574,484							69,961	30,819	145,900	143,899	263, 547	138,016	
FY 2020 OCO Enacted																			
FY 2020 Emergency																			1:58:58
FY 2020 Base Enacted		354,480	87,858	127,164	4,982	574,484							69,961	30,819	145,900	143,899	263,547	138,016	17, 2020 at 1
FY 2019 (Base + OCO)	11,391	306, 347	62,813	110,712		491,263	79,432		90,023	8,674	400								as of January
Act	01	01	01	01	01		02	02	, 02	02	02	02	02	02	02	02	02	02	on),
Item	In-House Laboratory Independent Research	Defense Research Sciences	University Research Initiatives	University and Industry Research Centers	Cyber Collaborative Research Alliance	c Research	Materials Technology	Biomedical Technology	Sensors and Electronic Survivability	TRACTOR HIP	TRACTOR JACK	Counter Improvised-Threat Advanced Studies	Lethality Technology	Army Applied Research	Soldier Lethality Technology	Ground Technology	Next Generation Combat Vehicle Technology	Network C31 Technology	21 President's Budget (Published Versi
Program Line Element No Number	1 0601101A	2 0601102A	3 0601103A	4 0601104A	5 0601121A	Basic	6 0602105A	7 0602115A	8 0602120A	9 0602122A	10 0602126A	11 0602134A	12 0602141A	13 0602142A	14 0602143A	15 0602144A	16 0602145A	17 0602146A	R-121PB: FY 202

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

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

	96117 71	Next Generation Combat Vehicle Technology	
	FO 07 70	ALOUND LECINIOLOGY	
5 125,435 U	125,43	Soldier Lethality Technology (14 0602143A
30,757 U	30,75	Army Applied Research	13 0602142A
42,425 U	12 42,42	Lethality Technology 0	12 0602141A
2,000 U	2,00	Counter Improvised-Threat Advanced (Studies	11 0602134A
D	12	TRACTOR JACK	10 0602126A
D	12	TRACTOR HIP C	9 0602122A
D	12	Sensors and Electronic Survivability (8 0602120A
11,835 U	11,83	Biomedical Technology C	7 0602115A
D	12	Materials Technology C	6 0602105A
463, 359	463,35	c Research	Basic
5,077 0	1 5,07	Cyber Collaborative Research (Alliance	5 0601121A
87,877 0	11 87,87	University and Industry Research (Centers	4 0601104A
67,148 U	1 67,14	University Research Initiatives	3 0601103A
303,257 U	1 303,25	Defense Research Sciences	2 0601102A
Ð	10	In-House Laboratory Independent (Research	1 0601101A
OCO for FY 2021 Direct War FY 2021 FY 2021 S OCO for Base and Enduring Total Fotal e Requirements Costs OCO (Base + OCO) c	FY 2021 ct Base	Item Ac	Frogram Line Element No Number

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

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

) cted S erg+ e c	327 U	359 U	71 U	D	347 U	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
FY 202C Total Enac (Base+Eme OCO)	120,3	98,3	95,7		18, 5															
FY 2020 OCO Enacted																				
FY 2020 Emergency																				1:58:58
FY 2020 Base Enacted	120, 327	98,359	95,771		18,947															/ 17, 2020 at 1
FY 2019 (Base + OCO)				80,424		25,127	90,496	43,454	28,623	102,899	86,737	4,884	11,890	379, 833	98,855	a 33,218	26,594	23, 755	15,364	as of January
Act	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	02	JY 02	02	ion),
Item	Long Range Precision Fires Technology	Future Verticle Lift Technology	Air and Missile Defense Technology	Aviation Technology	C3I Applied Cyber	Electronic Warfare Technology	Missile Technology	Advanced Weapons Technology	Advanced Concepts and Simulation	Combat Vehicle and Automotive Technology	Ballistics Technology	Chemical, Smoke and Equipment Defeating Technology	Joint Service Small Arms Program	Weapons and Munitions Technology	Electronics and Electronic Devices	Night Vision Technology	Countermine Systems	Human Factors Engineering Technolog	Environmental Quality Technology	21 President's Budget (Published Vers
Program Line Element No Number	18 0602147A	19 0602148A	20 0602150A	21 0602211A	22 0602213A	23 0602270A	24 0602303A	25 0602307A	26 0602308A	27 0602601 A	28 0602618A	29 0602622A	30 0602623A	31 0602624A	32 0602705A	33 0602709A	84 0602712A	35 0602716A	86 0602720A	R-121PB: FY 20.

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

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

						FY 2021 OCO for			
, T	Program Flement			FV 2021	FY 2021 Off for Base	Direct War	FY 2021 Total	FY 2021 Total	v) d
NO	Number	Item	Act	Base	Requirements	Costs	000	(Base + OCO)	0 0
ł			ł		****	1 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3			1
18	0602147A	Long Range Precision Fires Technology	02	60, 553				60, 553	D
19	0602148A	Future Verticle Lift Technology	02	96,484				96,484	D
20	0602150A	Air and Missile Defense Technology	02	56,298				56,298	D
21	0602211A	Aviation Technology	02						D
22	0602213A	C3I Applied Cyber	02	18,816				18,816	D
23	0602270A	Electronic Warfare Technology	02						D
24	0602303A	Missile Technology	02						D
25	0602307A	Advanced Weapons Technology	02						D
26	0602308A	Advanced Concepts and Simulation	02						D
27	0602601A	Combat Vehicle and Automotive Technology	02						D
28	0602618A	Ballistics Technology	02						D
29	0602622A	Chemical, Smoke and Equipment Defeating Technology	02						D
30	0602623A	Joint Service Small Arms Program	02						D
31	0602624A	Weapons and Munitions Technology	02						D
32	0602705A	Electronics and Electronic Devices	02						D
33	06027098	Night Vision Technology	02						D
34	0602712A	Countermine Systems	02						D
35	0602716A	Human Factors Engineering Technology	/ 02						D
90	0602720A	Environmental Quality Technology	02						D
R-12	1PB: FY 202	1 President's Budget (Published Versi	ion),	as of January	, 17, 2020 at 11	1:58:58			
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Department of the Army FY 2021President's Budget Exhibit R-1 FY 2021 President's Budget Total Obligational Authority (Dollars in Thousands)

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

10 e 20	D	D	D	D	D	D		D	D (D	D	D	D	D	P	D	D	
FY 2020 Total Enacte (Base+Emerg OCO)				20,873		112,955	1,259,374		83, 030					11,036				
FY 2020 OCO Enacted																		
FY 2020 Emergency																		1:58:58
FY 2020 Base Enacted				20,873		112,955	1,259,374		83,030					11,038				17, 2020 at 1
FY 2019 (Base + OCO)	51, 685	14,622	96, 922	17,157	55,467	87,229	1,553,764	40,501	94,575	165,035	240,862	171,448	48,542	6,270	22, 631	27,711		as of January
Act	02	02	02	02	02	02		03	03	60	03	03	80	03	03	03	бO	ion),
Item	Command, Control, Communications Technology	Computer and Software Technology	Military Engineering Technology	Manpower/Personnel/Training Technology	Warfighter Technology	Medical Technology	ied Research	Warfighter Advanced Technology	Medical Advanced Technology	Aviation Advanced Technology	Weapons and Munitions Advanced Technology	Combat Vehicle and Automotive Advanced Technology	Space Application Advanced Technology	Manpower, Personnel and Training Advanced Technology	TRACTOR HIKE	Next Generation Training & Simulation Systems	Medical Development	21 President's Budget (Published Vers
Program Line Element No Number	37 0602782A	38 0602783A	39 0602784A	40 0602785A	41 0602786A	42 0602787A	Appli	43 0603001A	44 0603002A	45 0603003A	46 0603004A	47 0603005A	48 0603006A	49 0603007A	50 0603009A	51 0603015A	52 D603115A	R-121PB: FY 202

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

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

			1:58:58	y 17, 2020 at 1	as of Januar	sion),	21 President's Budget (Published Ver	R-121PB: FY 202
	27,723				27,723	03	Medical Development	52 0603115A
5						03	Next Generation Training & Simulation Systems	51 0603015A
5						03	TRACTOR HIKE	50 0603009A
D	11, 659				11,659	03	Manpower, Personnel and Training Advanced Technology	49 0603007A
1						03	Space Application Advanced Technology	48 0603006A
5						03	Combat Vehicle and Automotive Advanced Technology	47 0603005A
5						03	Weapons and Munitions Advanced Technology	46 0603004A
þ						03	Aviation Advanced Technology	45 0603003A
þ	38,896				38, 896	03	Medical Advanced Technology	44 0603002A
þ						03	Warfighter Advanced Technology	43 0603001A
	922,881	2,000	2,000		920,881		ied Research	Appli
	95,496				95,496	02	Medical Technology	42 0602787A
						02	Warfighter Technology	41 0602786A
þ	20,766				20,766	02	Manpower/Personnel/Training Technology	40 0602785A
D						02	Military Engineering Technology	39 0602784A
L)						02	Computer and Software Technology	38 0602783A
5						02	Command, Control, Communications Technology	37 0602782A
0 0 0 1	FY 2021 Total (Base + OCO)	FY 2021 Total OCO	FI 2021 OCO for Direct War and Enduring Costs	FY 2021 OCO for Base Requirements	FY 2021 Base	Act	Item	Program Line Element No Number
			FV 2021					

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

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

189,386 1	1:58:58	189,386 174,892 117,2020 at 1	as of January	03 03	Long Range Precision Fires Advanced Technology Future Vertical Lift Advanced Technology 21 President's Budget (Published Vers:	67 0603464A 58 0603465A 8-121PB: FY 20
142,899 U		142,899		03	Network C3I Advanced Technology	66 0603463A
260,535 T		260,535		03	Next Generation Combat Vehicle Advanced Technology	65 0603462A
224,755 U		224,755	211,457	03	High Performance Computing Modernization Program	64 0603461A
23,769 U		23,769		03	C3I Cyber Advanced Development	63 0603457A
C			16,845	03	TRACTOR CAGE	62 0603322A
L			92,404	03	Missile and Rocket Advanced Technology	61 0603313A
			40,461	03	Electronic Warfare Technology	60 0603270A
ר				1 03	Counter Improvised-Threat Simulation	59 0603134A
נ			6,041	03	TRACTOR EGGS	58 0603131A
L			4,896	03	TRACTOR NAIL	57 0603130A
L			43,910	03	Combating Terrorism - Technology Development	56 0603125A
136,793 U		136, 793		03	Ground Advanced Technology	55 0603119A
135,968 C		135,968		03	Soldier Lethality Advanced Technology	54 0603118A
66,338 U		66, 338		: 03	Army Advanced Technology Development	53 0603117A
FY 2020 Total Enacted S FY 2020 (Base+Emerg+ e OCO Enacted OCO) c	FY 2020 Emergency	FY 2020 Base Enacted	FY 2019 (Base + OCO)	Act	Item	Program Line Element No Number

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

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

Ten TY 2021 TY		ເດຍເບ	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Item Act occost FY 2021 birect War occost FY 2021 occost FY 2021 birect War occost FY 202		FY 2021 Total (Base + OCO)	62, 663	109,608	14,795				25,000				23,357	188,024	199, 358	158, 608	121,060	156, 194
Item Action for the formation of the for		FY 2021 Total OCO																
ItemActFY 2021 BaseFY 2021 Co for Basedvanced Technology Development03109,608logy0314,795logy0314,795ing Terrorism - Technology0314,795ing Terrorism - Technology0314,795ment0319,608RAIL0314,795R NAIL0314,795R NAIL0314,795R NAIL0314,795R NAIL0314,795R NAIL0314,795R SGGS0314,795r Improvised-Threat Simulation03r Improvised-Threat Simulation03e and Rocket Advanced03logy03ber Advanced Development03logy199,358e and Rocket Advanced Development03itzation Program03itzation Program03eneration Combat Vehicle03eneration Combat Vehicle03itzation Program03itzation Program03itzatio	FY 2021 OCO for	Direct War and Enduring Costs																
ItemActFY 2021 Basedvanced Technology Development03109,608dogytethality Advanced03109,608logy0314,795ing Terrorism - Technology0314,795ing Terrorism - Technology0314,795ing Terrorism - Technology0314,795small0312,000conced Technology0325,000small0325,000conced Threat Simulation0325,000conce Warfare Technology0323,357conce Warfare Technology03199,358conce Warfare Technology03199,358conce Warfare Technology03199,358conce Warfare Technology03199,358centration Program03199,358certormance Computing03199,358certornology03199,358certornology03199,358certornology03199,358certornology03199,358certornology03199,358certornology03199,358certornology03199,358certornology03199,358certornology03199,358certornology03199,358certornology03199,358certornology03199,358certornology03199,358certornology03199,358certornology03158,608certorn		FY 2021 OCO for Base Requirements									₹1							
Item Act dvanced Technology Development 03 r Lethality Advanced 03 logy l Advanced Technology 03 ling Terrorism - Technology 03 pment 03 ment 03 ment 03 ment 03 r Improvised-Threat Simulation 03 r Improvised-Threat Simulation 03 conic Warfare Technology 03 ment 03 conic Warfare Technology 03 logy 03 r Improvised Development 03 logy 03 read Rocket Advanced 03 logy 03 reation Program 03 ization Program 03 ication Program 03 set Advanced Technology 03 reation Program 03 ication Fires Advanced 03 led Technology 03 reage Precision Fires Advanced 03 logy 03		FY 2021 Base	62, 663	109, 608	14,795				25,000				23, 357	188,024	199, 358	158,608	121,060	156,194
		Act	dvanced Technology Development 03	r Lethality Advanced 03 logy	Advanced Technology 03	ing Terrorism - Technology 03 pment	R NAIL 03	R EGGS 03	r Improvised-Threat Simulation 03	onic Warfare Technology 03	e and Rocket Advanced 03 logy	R CAGE 03	ber Advanced Development 03	erformance Computing 03 ization Program	eneration Combat Vehicle 03 ed Technology	k C3I Advanced Technology 03	ange Precision Fires Advanced 03 logy	Vertical Lift Advanced 03 logy
		Line E No Ni	53 01	54 0	55 0	56 0	57 0	58 0	59 0	60 09	61 0	62 0	63 0	64 0	65 0	66 0	67 0	8

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

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

n c e s T c e s	D	D	D	D	D	D	D	Þ	D	10	U 7	D	D	D	D	D		
FY 2020 Total Enacte (Base+Emerg (Base-Emerg	82,113									1,531,516	59,487		52,980	82,915		77,696		
FY 2020 OCO Enacted													500					
FY 2020 Emergency																	1:58:58	
FY 2020 Base Enacted	82,113									1,531,516	59,487		52,480	82,915		77,696	17, 2020 at 1	UNCLASSIFIED
FY 2019 (Base + 0CO)		16,860	22,628	69,094	28,079	100,359	45,799	45,168		1,561,576	60,301		44,743	40,255	19,852	40,358	as of January	
Act	03	03	03	03	03	03	03	03	03		04	04	04	04	04	04	ion),	
I tem	5A Air and Missile Defense Advanced Technology	5A Landmine Warfare and Barrier Advanced Technology	A Joint Service Small Arms Program	A Night Vision Advanced Technology	3A Environmental Quality Technology Demonstrations	A Military Engineering Advanced Technology	2A Advanced Tactical Computer Science and Sensor Technology	A C3 Advanced Technology)A Humanitarian Demining	ivanced Technology Development	Army Missle Defense Systems Integration	3A Army Space Systems Integration	/A Air and Missile Defense Systems Engineering)A Landmine Warfare and Barrier - Adv Dev	7A Smoke, Obscurant and Target Defeating Sys-Adv Dev	3A Tank and Medium Caliber Ammunition	2021 President's Budget (Published Versi	
Program Element Number	0603466	0603606	0603607.	0603710	0603728	0603734	0603772	0603794	0603920	Ad	0603305	0603308	0603327	0603619 T	0603627	0603639	lPB: FY	
Line No	69	70	71	72	73	74	75	76	LL		78	79	80	81	8 37	с 8	R-12	xxiii

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

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

					FY 2021 OCO for			
Program Line Element No Number	Item	Act	FY 2021 Base	FY 2021 OCO for Base Requirements	Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 5 Total 6 (Base + OCO) 6	60 (D) (D) (
69 0603466	Air and Missile Defense Advanced Technology	60	58,130				58,130 U	5
70 0603606	A Landmine Warfare and Barrier Advanced Technology	03					ſ	5
71 0603607	A Joint Service Small Arms Program	03					l	5
72 0603710	A Night Vision Advanced Technology	03					נ	Б
73 0603726	A Environmental Quality Technology Demonstrations	03						5
74 0603734	A Military Engineering Advanced Technology	03					L	-
75 0603772	Advanced Tactical Computer Science and Sensor Technology	03						5
76 0603794	A C3 Advanced Technology	03						D
77 0603920	A Humanitarian Demining	03	8,515				8,515 U	5
Ad	vanced Technology Development		1,203,590				1,203,590	
78 0603305	Army Missle Defense Systems Integration	04	11,062				11,062 U	Б
79 0603308	Army Space Systems Integration	04	26,230				26,230 U	5
80 0603327	Air and Missile Defense Systems Engineering	04	26,482		500	500	26,982 t	5
81 0603615	A Landmine Warfare and Barrier - Adv Dev	04	64,092				64,092 [5
82 0603627	A Smoke, Obscurant and Target Defeating Sys-Adv Dev	04						5
83 0603635	A Tank and Medium Caliber Ammunition	04	92,753				92,753 1	5
R-121PB: FY	2021 President's Budget (Published Vers	ion), a	s of January	17, 2020 at 1	1:58:58	9		

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

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

D	10,023			10,023	9,396	04	Analysis Of Alternatives	3 D604100A	
D						04	Low Earth Orbit (LEO) Satellite Capability	2 0604035A	2
D	23,043			23,043		04	Electronic Warfare Technology Maturation (MIP)	5 0604021A	96
D				1	8,225	04	Cross Functional Team (CFT) Advanced Development & Prototyping	5 0604020A	9
D	84,381			84,381	70,745	04	Robotics Development	1 0604017A	94
D	26,113			26,113	30, 384	04	Soldier Systems - Advanced Development	3 0603827A	5
D	36,975			36,975	38,371	04	Medical Systems - Adv Dev	2 0603807A	6
D	7,339	1,085		6,254	18,845	04	Logistics and Engineer Equipment - Adv Dev	L 0603804A	91
D	505,890			505,890	93, 885	04	Aviation - Adv Dev) 0603801A	96
D	5,406			5,406	3,564	04	NATO Research and Development	0603790A	80
D	19,561			19,561	14,190	04	Environmental Quality Technology - Dem/Val	3 0603779A	8
D	200,791			200,791	7,072	04	Night Vision Systems Advanced Development	7 0603774A	8
Þ	37,490			37,490	35, 667	04	Tactical Electronic Surveillance System - Adv Dev	5 0603766A	86
D	9,514	3,000		6,514	8,067	04	Soldier Support and Survivability	0603747A	8
D	144,234			144,234	80,106	04	Armored System Modernization - Adv Dev	1 0603645A	84
000	FY 2020 Total Enacted (Base+Emerg+ OCO)	FY 2020 OCO Enacted	FY 2020 Emergency	FY 2020 Base Enacted	FY 2019 (Base + OCO)	Act	Item	Program Element Number	Liné No

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

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

0 0 0 1 0 0 0 0	D	D	D	Þ	D	D	Þ	D	D	D	D	D	D	D	Þ
FY 2021 Total (Base + OCC	151,478	5,841	194,775	24,316	13, 387	4,762	647,937	4,761	28,520	26, 138	121,207		22 , 84C	22 , 67E	10,082
FY 2021 Total OCO															
Direct War and Enduring Costs															
FY 2021 OCO for Base Requirements															
FY 2021 Base	151,478	5,841	194,775	24,316	13, 387	4,762	647,937	4,761	28,520	26,138	121,207		22,840	22,678	10,082
Act 	04	04	04	04	04	04	04	04	04	04	04	04	04	04	04
Item	Armored System Modernization - Adv Dev	Soldier Support and Survivability	Tactical Electronic Surveillance System - Adv Dev	Night Vision Systems Advanced Development	Environmental Quality Technology - Dem/Val	NATO Research and Development	Aviation - Adv Dev	Logistics and Engineer Equipment - Adv Dev	Medical Systems - Adv Dev	Soldier Systems - Advanced Development	Robotics Development	Cross Functional Team (CFT) Advanced Development & Prototyping	Electronic Warfare Technology Maturation (MIP)	Low Earth Orbit (LEO) Satellite Capability	Analysis Of Alternatives
Program Element Number	0603645A	0603747A	0603766A	0603774A	0603779A	0603790A	0603801A	0603804A	0603807A	0603827A	0604017A	0604020A	0604021A	0604035A	0604100A
Line No	84	85	86	87	88	89	90	91	92	93	94	95	96	5	8

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

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

Line No	Program Element Number	Item	Act	FY 2019 (Base + 0CO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted (Base+Emerg- OCO)	ເດຍເບ
66	0604101A	Small Unmanned Aerial Vehicle (SUAV) (6.4)	04						D
100	0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04	12, 393	40,745			40,745	D
101	0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	84,981	379,772			379,772	D
102	0604115A	Technology Maturation Initiatives	04	91,749	179,676			179,676	D
103	0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04	75,711	42,900			42,900	D
104	0604118A	TRACTOR BEAM	04	52,894					D
105	0604119A	Army Advanced Component Development & Prototyping	04		112,806		4,529	117,335	D
106	0604120A	Assured Positioning, Navigation and Timing (PNT)	04						D
107	0604121A	Synthetic Training Environment Refinement & Prototyping	04	39,890	103, 621			103, 621	D
108	0604134A	Counter Improvised-Threat Demonstration, Prototype Development, and Testing	04						D
109	0604182A	Hypersonics	04		404,000			404,000	D
110	0604319A	Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	04	10,324					D
	70604403A	Future Interceptor	04		2,000			2,000	D
112	0604541A	Unified Network Transport	04		29,700			29,700	D
113	0604644A	Mobile Medium Range Missile	04		5,000			5,000	Ð
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Department of the Army FY 2021President's Budget Exhibit R-1 FY 2021 President's Budget Total Obligational Authority (Dollars in Thousands)

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

Program ne Element			FY 2021	FY 2021 OCO for Base	FY 2021 OCO for Direct War and Enduring	FY 2021 Total	FY 2021 Total	υ Ω
Number	Item	Act	Base	Requirements	Costs	000	(Base + OCO)	U I
9 0604101A	Small Unmanned Aerial Vehicle (SUAV) (6.4)	04	1,378				1,378	D
0 0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04	40,083				40,083	D
1 0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	376, 373				376, 373	D
2 0604115A	Technology Maturation Initiatives	04	156,834				156, 834	D
)3 0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04	4,995				4,995	D
04 0604118A	TRACTOR BEAM	04						D
05 0604119A	Army Advanced Component Development & Prototyping	04	170,490				170,490	D
06 0604120A	Assured Positioning, Navigation and Timing (PNT)	04	128,125				128, 125	D
17 0604121 A	Synthetic Training Environment Refinement & Prototyping	04	129,547				129,547	D
)8 0604134A	Counter Improvised-Threat Demonstration, Prototype Development, and Testing	04	13, 831				13, 831	D
9 0604182A	Hypersonics	04	801,417				801,417	D
.0 0604319A	Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	04						D
T 0604403A	Future Interceptor	04	7,992				7,992	D
2 0604541A	Unified Network Transport	04	40,677				40,677	p
3 0604644A	Mobile Medium Range Missile	04						Þ
121PB: FY 202	21 President's Budget (Published Versi	on), ē	ıs of January	17, 2020 at 11	:58:58			
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Department of the Army FY 2021President's Budget Exhibit R-1 FY 2021 President's Budget Total Obligational Authority (Dollars in Thousands)

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

								FY 2020	
Line	Program Element			FY 2019	FY 2020	FY 2020	FY 2020	Total Enacted (Base+Emerg+	s a
NO	Number	Item	Act	(Base + 0C0)	Base Enacted	Emergency	OCO Enacted	000)	UI
114	0604785A	Integrated Base Defense (Budget Activity 4)	04				2,000	2,000	D
115	0305251A	Cyberspace Operations Forces and Force Support	04	52,817	52,102			52,102	D
116	1206120A	Assured Positioning, Navigation and Timing (PNT)	04	123, 364	139,110			139,110	D
117	1206308A	Army Space Systems Integration	04	45,420	104,996			104,996	D
	Advan	iced Component Development & Prototype	S	1,213,569	2,975,681		11,114	2,986,795	
118	0604201A	Aircraft Avionics	05	31,401	8,414			8,414	D
119	0604270A	Electronic Warfare Development	05	56,310	59, 539			59, 539	D
120	0604328A	TRACTOR CAGE	05	27,050					D
121	0604601A	Infantry Support Weapons	05	74,629	87,179			87,179	D
122	0604604A	Medium Tactical Vehicles	05	3,905					D
123	0604611A	JAVELIN	05	5,250	14,997			14,997	D
124	0604622A	Family of Heavy Tactical Vehicles	05	11,182	13,125			13, 125	D
125	0604633A	Air Traffic Control	05	11,580	5,781			5,781	D
126	0604642A	Light Tactical Wheeled Vehicles	05	1,013	2,965			2,965	Ŋ
127	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	359,017	285,136			285,136	D
128	p604710A	Night Vision Systems - Eng Dev	05	139, 337	143, 696			143,696	D
129	0604713A	Combat Feeding, Clothing, and Equipment	05	4,393	7,393			7, 393	D
R-121	PB: FY 202	1 President's Budget (Published Versi	, (no.	as of January	17, 2020 at 11	:58:58			

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

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

3,424,128 2,764 U 62,426 U	91,574 U 8,523 U 8,523 U 7,493 U 24,792 U 3,511 U 1,976 U 1,976 U 1,976 U 1,976 U 1,976 U 2,814 U
62,426	91,574 8,523 7,493 24,792 3,511 1,976 1,976 135,488 61,445 2,814
	TRACTOR CAGE Infantry Support Weapons Medium Tactical Vehicles JAVELIN Family of Heavy Tactical Vehicles Air Traffic Control Light Tactical Wheeled Vehicles Armored Systems Modernization (ASM - Eng Dev Night Vision Systems - Eng Dev Combat Feeding, Clothing, and Equipment
120 0604328A	121 0604601A 122 0604604A 123 0604611A 124 0604622A 126 0604642A 126 0604642A 127 0604645A 127 0604645A 128 0604710A 129 0604713A

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

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

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FY 2020 Total Enacted (Base+Emerg+ OCO)	30, 912	33, 502	11, 636	10,915	7,801	20,000	9,241	38, 303	186, 323	107,826	12, 595	48,264	37,108	129,974	95,720		
FY 2020 OCO Enacted																	
FY 2020 Emergency																1:58:58	
FY 2020 Base Enacted	30,912	33, 502	11,636	10,915	7,801	20,000	9,241	38,303	186, 323	107,826	12,595	48,264	37,108	129,974	95,720	17, 2020 at 1	UNCLASSIFIED
FY 2019 (Base + OCO)	42,604	208,965	21,354	10,104	8,423	6, 568	20,514	48,030	173,713	70,096	15,366	45,054	39,261	163,229	37,847	as of January	
Act	05	05	05	05	05	05	05	02	05	05	05	05	05	05	05	(uc	
Item	Non-System Training Devices - Eng Dev	Air Defense Command, Control and Intelligence - Eng Dev	Constructive Simulation Systems Development	Automatic Test Equipment Development	Distributive Interactive Simulations (DIS) - Eng Dev	Brilliant Anti-Armor Submunition (BAT)	Combined Arms Tactical Trainer (CATT) Core	Brigade Analysis, Integration and Evaluation	Weapons and Munitions - Eng Dev	Logistics and Engineer Equipment - Eng Dev	Command, Control, Communications Systems - Eng Dev	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	Landmine Warfare/Barrier - Eng Dev	Army Tactical Command & Control Hardware & Software	Radar Development	21 President's Budget (Published Versi	
Program ine Element Vo Number	130 0604715A	131 0604741A	132 0604742 A	133 0604746A	134 0604760 A	135 0604768A	136 0604780 A	137 0604798A	138 0604802A	139 0604804A	140 0604805A	141 0604807A	142 0604808A	143 D604818A	144 D604820A	-21PB: FY 20	xxxi
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Department of the Army FY 2021President's Budget Exhibit R-1 FY 2021 President's Budget Total Obligational Authority (Dollars in Thousands)

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

5000	D	D	Þ	D	D	D	D	D	D	D	D	D	D	D	D	
FY 2021 Total (Base + OCO)	28, 036	70, 651	10,150	5,578	7,892	24,975	3, 568	19,268	265,811	49, 694	11,079	49,870	9,589	162,513	109,259	
FY 2021 Total OCO		27,000														
FY 2021 OCO for Direct War and Enduring Costs		27,000														1:58:58
FY 2021 OCO for Base Requirements																17, 2020 at 1. UNCLASSIFIED
FY 2021 Base	28,036	43,651	10,150	5,578	7,892	24,975	3,568	19,268	265,811	49, 694	11,079	49,870	9,589	162,513	109,259	as of January
Act	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	, (no-
I tem	Non-System Training Devices - Eng Dev	Air Defense Command, Control and Intelligence - Eng Dev	Constructive Simulation Systems Development	Automatic Test Equipment Development	Distributive Interactive Simulations (DIS) - Eng Dev	Brilliant Anti-Armor Submunition (BAT)	Combined Arms Tactical Trainer (CATT) Core	Brigade Analysis, Integration and Evaluation	Weapons and Munitions - Eng Dev	Logistics and Engineer Equipment - Eng Dev	Command, Control, Communications Systems - Eng Dev	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	Landmine Warfare/Barrier - Eng Dev	Army Tactical Command & Control Hardware & Software	Radar Development	21 President's Budget (Published Versi
Program Line Element No Number	130 0604715A	131 0604741 A	132 0604742A	133 0604746A	134 0604760A	135 0604768A	136 0604780A	137 0604798A	138 0604802A	139 0604804A	140 0604805A	141 0604807A	142 0604808A	143 0604818A	144 0604820A	R-121PB: FY 202

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

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

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FY 2020	TOTAL ENACTED (Base+Emerg+ OCO)	42,883	17,294	4,803	85,198	10,732	88, 689	102,073	83, 830	6, 699	15,882	40,808		3,847	6, 928	23,179	10,000		
	FY 2020 OCO Enacted																		
	FY 2020 Emergency																	1:58:58	
	FY 2020 Base Enacted	42,883	17,294	4,803	85,198	10,732	88, 689	102,073	83, 830	6, 699	15,882	40,808		3,847	6, 928	23,179	10,000	17, 2020 at 1	UNCLASSIFIED
	FY 2019 (Base + OCO)	35,468	25,856	10,044	50, 380	1,722	74,551	158,807	107,521	3,104	15,287	42,134	107,926	4,980	4,326	32,025	10,883	as of January	
	Act	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	on),	
	Item	General Fund Enterprise Business System (GFEBS)	Firefinder	Soldier Systems - Warrior Dem/Val	Suite of Survivability Enhancement Systems - EMD	Artillery Systems - EMD	Information Technology Development	Integrated Personnel and Pay System-Army (IPPS-A)	Armored Multi-Purpose Vehicle (AMPV)	<pre>Integrated Ground Security Surveillance Response Capability (IGSSR-C)</pre>	Joint Tactical Network Center (JTNC)	Joint Tactical Network (JTN)	TRACTOR TIRE	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	Tactical Security System (TSS)	Common Infrared Countermeasures (CIRCM)	Combating Weapons of Mass Destruction (CWMD)	21 President's Budget (Published Versi	
	Frogram Line Element No Number	145 0604822 A	146 0604823A	147 0604827A	148 0604852A	149 0604854A	150 0605013A	151 0605018A	152 0605028A	153 0605029A	154 0605030A	155 0605031 A	156 0605032A	157 0605033A	158 0605034A	159 0605035 A	160 0605036A	R-121PB: FY 20	xxxiii

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

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

	21 S 1 e 0CO) c	,201 U	,008 U	,534 U	,459 U	,611 U	,678 U	,286 U	,594 U	D	,264 U	,696 U	D	,976 U	D	,621 U	D	
	FY 20 Tota (Base +	21	20	Q	82	11	142	115	96		16	31		ഹ		25		
	FY 2021 Total OCO															2,300		
FY 2021 000 for	Direct War and Enduring Costs															2,300		1:58:58
	FY 2021 OCO for Base Requirements																	, 17, 2020 at 1
	FY 2021 Base	21,201	20,008	6, 534	82,459	11,611	142,678	115,286	96, 594		16,264	31, 696		5,976		23, 321		as of January
	Act	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	05	ion),
	Item	General Fund Enterprise Business System (GFEBS)	Firefinder	Soldier Systems - Warrior Dem/Val	Suite of Survivability Enhancement Systems - EMD	Artillery Systems - EMD	Information Technology Development	Integrated Personnel and Pay System-Army (IPPS-A)	Armored Multi-Purpose Vehicle (AMPV)	Integrated Ground Security Surveillance Response Capability (IGSSR-C)	Joint Tactical Network Center (JTNC)	Joint Tactical Network (JTN)	TRACTOR TIRE	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	Tactical Security System (TSS)	Common Infrared Countermeasures (CIRCM)	Combating Weapons of Mass Destruction (CWMD)	1 President's Budget (Published Versi
	Program Line Element No Number	145 0604822A	146 0604823A	147 0604827A	148 0604852A	149 0604854A	150 0605013A	151 0605018A	152 0605028A	153 0605029A	154 0605030A	155 0605031A	156 0605032A	157 0605033A	158 0605034A	159 0605035A	160 0605036A	R-121₽В: FY 202. X

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

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

Line	Program Element	T + 0.00	4 (FY 2019	FY 2020	FY 2020	FY 2020	FY 2020 Total Enacted (Base+Emerg+	
De la						fortaframe			יוו כ
161	0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05	14,517	6, 054			6,054	Þ
162	0605041A	Defensive CYBER Tool Development	05	33, 796	50,662			50,662	Þ
163	0605042A	Tactical Network Radio Systems (Low-Tier)	05	18,761	28,404			28,404	D
164	0605047A	Contract Writing System	05	40,341	17,082			17,082	D
165	0605049A	Missile Warning System Modernization (MWSM)	05	7,321	1,539			1,539	D
166	0605051A	Aircraft Survivability Development	05	56,067	55,057		77,420	132,477	D
167	0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	92,674	194,366			194,366	D
168	0605053A	Ground Robotics	05	65,311	26,104			26,104	D
169	0605054A	Emerging Technology Initiatives	05	46,451	37,696			37,696	D
170	0605145A	Medical Froducts and Support Systems Development	05						D
171	0605203A	Army System Development & Demonstration	05		164,883		19,527	184,410	D
172	0605205A	Small Unmanned Aerial Vehicle (SUAV) (6.5)	05						D
173	0605380A	AMF Joint Tactical Radio System (JTRS)	05	15,379					D
174	0605450A	Joint Air-to-Ground Missile (JAGM)	05	12,440	6,585			6,585	D
175	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	318,850	208, 638			208, 638	D
R-12	1PB: FY 202	:1 President's Budget (Published Versi	ion),	as of January	17, 2020 at 11	:58:58			
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Department of the Army FY 2021President's Budget Exhibit R-1 FY 2021 President's Budget Total Obligational Authority (Dollars in Thousands)

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

	Program				FY 2021	FY 2021 OCO for Direct War	FY 2021	FY 2021	S
Line No	Element Number	Item	Act	FY 2021 Base	OCO for Base Requirements	and Enduring Costs	Total OCO	Total (Base + OCO)	υu
ł		1	Į						I.
161	0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05	4,846				4,846	D
162	0605041A	Defensive CYBER Tool Development	05	28,544				28,544	D
163	0605042 A	Tactical Network Radio Systems (Low-Tier)	05	28,178				28,178	D
164	0605047 A	Contract Writing System	05	22,860				22,860	D
165	0605049A	Missile Warning System Modernization (MWSM)	05						D
166	0605051A	Aircraft Survivability Development	05	35, 893		64,625	64,625	100,518	D
167	0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	235,770				235,770	D
168	0605053A	Ground Robotics	05	13,710				13,710	D
169	0605054A	Emerging Technology Initiatives	05	294,739				294,739	D
170	0605145A	Medical Products and Support Systems Development	05	954				954	D
171	0605203 A	Army System Development & Demonstration	05	150,201				150,201	D
172	0605205A	Small Unmanned Aerial Vehicle (SUAV) (6.5)	05	5,999				5,999	D
173	0605380A	AMF Joint Tactical Radio System (JTRS)	05						D
174	0605450A	Joint Air-to-Ground Missile (JAGM)	05	8,891				8,891	D
175	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	193,929				193,929	D
R-121 ivxxx21	₽B: FY 202	1 President's Budget (Published Versi	ion), a	as of January	17, 2020 at 11 UNCLASSIFIED	:58:58			

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

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

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FY 2020 Total Enacted (Base+Emerg+ OCO)	205,620	7,835	7,232	1,664	3,936			18,432		3,089,926	42,117	28,327	146,565	13,113	238, 691	36, 922		336, 468	
FY 2020 OCO Enacted								3,200		100,147									
FY 2020 Emergency																			1:58:58
FY 2020 Base Enacted	205,620	7,835	7,232	1,664	3,936			15,232		2,989,779	42,117	28,327	146,565	13,113	238,691	36,922		336, 468	17, 2020 at 11
FY 2019 (Base + OCO)		12,340		7,616	5,721	18, 381	285	8,922	23,170	3,119,552	46,732	31,286	79,214	19,071	237,414	30,667	303, 386	311,027	as of January
Act	05	05	05	05	05	05	05	05	05		06	90	90	90	90	06	90	06	, (no.
Item	Manned Ground Vehicle	National Capabilities Integration (MIP)	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	Aviation Ground Support Equipment	TROJAN - RH12	Auctioned Spectrum Relocation Fund	Spectrum Access Research and Development	Electronic Warfare Development	Tractor Bears	em Development & Demonstration	Threat Simulator Development	Target Systems Development	Major T&E Investment	Rand Arroyo Center	Army Kwajalein Atoll	Concepts Experimentation Program	Small Business Innovative Research	Army Test Ranges and Facilities	21 President's Budget (Published Versi
Program Line Element No Number	176 0605625A	177 0605766A	178 0605812A	179 0605830A	180 0303032A	181 0303267A	182 0303367A	183 0304270A	184 1205117A	Syste	185 0604256A	186 0604258A	187 0604759A	188 0605103A	189 0605301A	190 0605326A	191 0605502A	192 0605601A	R-121PB: FY 202

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

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

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FY 2021 Total (Base + OCO	327,732	7,670	1,742	1,467	3,451			59,755		3,297,623	14,515	10,668	106,270	13,481	231,824	54,898		350, 359	
FY 2021 Total OCO								3, 900		97,825									
FY 2021 OCO for Direct War and Enduring Costs								3, 900		97,825									:58:58
FY 2021 OCO for Base Requirements																			17, 2020 at 11
FY 2021 Base	327,732	7,670	1,742	1,467	3,451			55, 855		3,199,798	14,515	10,668	106,270	13,481	231,824	54,898		350, 359	as of January
Act	05	05	05	05	05	05	05	05	05		06	90	90	90	90	06	90	90	ion),
Item	Manned Ground Vehicle	National Capabilities Integration (MIP)	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	Aviation Ground Support Equipment	TROJAN - RH12	Auctioned Spectrum Relocation Fund	Spectrum Access Research and Development	Electronic Warfare Development	Tractor Bears	em Development & Demonstration	Threat Simulator Development	Target Systems Development	Major T&E Investment	Rand Arroyo Center	Army Kwajalein Atoll	Concepts Experimentation Program	Small Business Innovative Research	Army Test Ranges and Facilities	21 President's Budget (Published Vers
Program ne Element o Number	76 0605625A	77 0605766A	78 0605812A	79 0605830A	80 0303032A	81 0303267A	82 0303367A	83 0304270 A	84 1205117A	Syste	85 0604256A	86 0604258A	87 0604759A	88 0605103A	89 0605301A	90 0605326A	91 0605502A	92 0605601A	124 PB: FY 202
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Department of the Army FY 2021President's Budget Exhibit R-1 FY 2021 President's Budget Total Obligational Authority (Dollars in Thousands)

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

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FY 20 Total En (Base+E OCO	61	35	ю	9	21	11	52	60	N	58	30	54	4	53	0	62	
FY 2020 OCO Enacted																	
FY 2020 Emergency																	1:58:58
FY 2020 Base Enacted	61,974	35,075	3,461	6, 233	21,342	11,168	52,723	60,815	2,527	58,175	30,060	54,458	4,681	53,820	2,141	62,069	17, 2020 at 1
FY 2019 (Base + OCO)	82,617	39, 886	3,796	9,495	21,043	15,026	52,139	56, 532	2,708	60,218	28,237	66, 678	3, 138	53, 526	4,241	60, 808	as of January
Act	90	90	06	90	06	06	90	90	90	06	90	90	90	90	90	06	ion),
Item	Army Technical Test Instrumentation and Targets	Survivability/Lethality Analysis	Aircraft Certification	Meteorological Support to RDT&E Activities	Materiel Systems Analysis	Exploitation of Foreign Items	Support of Operational Testing	Army Evaluation Center	Army Modeling & Sim X-Cmd Collaboration & Integ	Programwide Activities	Technical Information Activities	Munitions Standardization, Effectiveness and Safety	Environmental Quality Technology Mgmt Support	Army Direct Report Headquarters - R&D - MHA	Military Ground-Based CREW Technology	Ronald Reagan Ballistic Missile Defense Test Site	21 President's Budget (Published Vers
Program Line Element No Number	193 0605602A	194 0605604A	195 0605606A	196 0605702A	197 0605706A	198 0605709A	199 0605712A	200 0605716A	201 0605718A	202 0605801A	203 0605803A	204 0605805A	205 0605857A	206 0605898A	207 0606001A	208 0606002A	R-121PB: FY 202

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

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

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FY 2021 Total (Base + OCC	48,475	36,001	2,736	6,488	21,859	8,936	54,470	63,141	2,572	87,472	26,244	40,133	1,780	55,045		71,306
FY 2021 Total OCO						1,000										
OCO FOF Direct War and Enduring Costs						1,000										
FY 2021 OCO for Base Requirements																
FY 2021 Base	48,475	36,001	2,736	6, 488	21,859	7,936	54,470	63,141	2,572	87,472	26,244	40,133	1,780	55,045		71,306
Act	06	06	06	90	06	06	06	06	06	06	06	06	90	90	90	06
Item	Army Technical Test Instrumentation and Targets	Survivability/Lethality Analysis	Aircraft Certification	Meteorological Support to RDT&E Activities	Materiel Systems Analysis	Exploitation of Foreign Items	Support of Operational Testing	Army Evaluation Center	Army Modeling & Sim X-Cmd Collaboration & Integ	Programwide Activities	Technical Information Activities	Munitions Standardization, Effectiveness and Safety	Environmental Quality Technology Mgmt Support	Army Direct Report Headquarters - R&D - MHA	Military Ground-Based CREW Technology	Ronald Reagan Ballistic Missile Defense Test Site
Program e Element Number	93 0605602A	94 0605604A	95 0605606A	96 0605702A	97 0605706A	98 0605709 A	99 0605712A	00 0605716A	01 0605718A	02 0605801A	03 0605803A	04 0605805A	05 0605857A	06 0605898A	07 0606001A	G8 0606002A

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

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

Line No 2009 211 212 213 213 214 213 215 215 215 215 217 217	Program Element Number 0606105A 0606942A 09099980A 0909999A Manag 0603778A 0603813A 0603813A 0607131A	Item CounterIntel and Human Intel Modernization Medical Program-Wide Activities Assessments and Evaluations Cyber Vulnerabilities Judgment Fund Reimbursement Financing for Cancelled Account Adjustments ement Support MLRS Product Improvement Program TRACTOR PULL Anti-Tamper Technology Support Weapons and Munitions Product Improvement Programs TRACTOR SWOKE	Act 06 06 07 07 07 07 07	FY 2019 (Base + OCO) 1 2,636 88,300 88,300 88,300 122 122 122 4,067 7,159 17,992 17,992	FY 2020 Jase Enacted 1,050 4,500 1,368,475 14,615 8,491 15,645	FY 2020 Emergency	FY 2020 OCO Enacted 1,875 1,875	FY 2020 Total Enacted (Base+Emerg+ (Base+Emerg+ 2,925 1,370,350 1,370,350 14,615 14,615 15,645 1	ם ם ם ם ם ם ם ם ם ם ם ם ם ם ם ם ם ם ם
219	0607134A	Long Range Precision Fires (LRPF)	07	152,573	156, 682			156, 682 1	6
220	0607135A	Apache Product Improvement Program	07	22,914				1	÷
221	0607136A	Blackhawk Product Improvement Program	07	33, 906	23, 039			23,039	5
222	0607137A	Chinook Product Improvement Program	07	139,003	171,471			171,471 [
223	D607138A	Fixed Wing Product Improvement Program	07	2,146				1	5
224	D607139A	Improved Turbine Engine Program	07	173,766	206,434			206,434 1	5
R-12	1PB: FY 202	1 President's Budget (Published Versi	on),	as of January :	17, 2020 at 11	:58:58			

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

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

						FY 2021			
Line No	Program Element Number	Item	Act	FY 2021 Base	FY 2021 OCO for Base Requirements	UCU IOF Direct War and Enduring Costs	FY 2021 Total OCO	FY 2021 Total (Base + OCO)	လမပ
ł			ĺ						1
209	0606003A	CounterIntel and Human Intel Modernization	06	1,063		4,137	4,137	5,200	D
210	0606105A	Medical Program-Wide Activities	06	19,891				19,891	D
211	0606942A	Assessments and Evaluations Cyber Vulnerabilities	06	4,496				4,496	D
212	A08980A	Judgment Fund Reimbursement	90						D
213	A90999A	Financing for Cancelled Account Adjustments	06						D
	Manag	ement Support		1, 333, 123		5,137	5,137	1,338,260	
214	0603778A	MLRS Product Improvement Program	07	10,157				10,157	Þ
215	0603813A	TRACTOR PULL	07						D
216	0605024A	Anti-Tamper Technology Support	07	8, 682				8, 682	D
217	0607131A	Weapons and Munitions Product Improvement Programs	07	20,409				20,409	D
218	0607133A	TRACTOR SMOKE	07						D
219	0607134A	Long Range Precision Fires (LRPF)	07	122,733				122,733	D
220	0607135A	Apache Product Improvement Program	07						D
221	0607136A	Blackhawk Product Improvement Program	07	11,236				11,236	D
222	0607137A	Chinook Product Improvement Progra	m 07	46,091				46,091	D
223	0 607138A	Fixed Wing Product Improvement Program	07						D
224	0607139A	Improved Turbine Engine Program	07	249,257				249,257	D
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Department of the Army FY 2021President's Budget Exhibit R-1 FY 2021 President's Budget Total Obligational Authority (Dollars in Thousands)

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

Progra Line Elemen No Number	t Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted (Base+Emerg+ OCO)	02 0 0 1
225 060714	2A Aviation Rocket System Product Improvement and Development	07	35,211	1,927			1,927	U.
226 060714	3A Unmanned Aircraft System Universal Products	07	36, 488	18,132			18,132	5
227 060714	5A Apache Future Development	07		5,448			5,448	
228 060715	0A Intel Cyber Development	07						
229 060731	2A Army Operational Systems Development	c 07		45,026			45,026	L)
230 060766	5A Family of Biometrics	07	2,320	1,702			1,702	L)
231 060786	5A Patriot Product Improvement	07	72,895	87,430			87,430	
232 020372	8A Joint Automated Deep Operation Coordination System (JADOCS)	07	29,782	47,398			47,398	L)
233 020373	5A Combat Vehicle Improvement Programs	07	321,513	277,633			277,633	L)
234 020374	3A 155mm Self-Propelled Howitzer Improvements	07	35, 681	199,274			199,274	L)
235 020374	4A Aircraft Modifications/Product Improvement Programs	07	13, 629	9,278			9,278	
236 020375	2A Aircraft Engine Component Improvement Program	01	146	144			144	μ L
237 020375	8A Digitization	07	6,077	5,270			5,270	
238 020380	1A Missile/Air Defense Product Improvement Program	01	3, 588	1,287		- 19 19	1,287	L)
239 020380	2A Other Missile Product Improvement Programs	07	4,760					
240 020380	8A TRACTOR CARD	07	34,050					
R-121PB: FY	2021 President's Budget (Published Versi	ion),	as of January	17, 2020 at 11	1:58:58			
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Department of the Army FY 2021President's Budget Exhibit R-1 FY 2021 President's Budget Total Obligational Authority (Dollars in Thousands)

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

						FY 2021			
Trine	Program Flement			FY 2021	FY 2021 OCO for Base	Direct War and Enduring	FY 2021 Total	FY 2021 Total	0 N
No	Number	Item	Act	Base	Requirements	Costs	000	(Base + 0CO)	υ
l			l.						I.
225	0607142A	Aviation Rocket System Product Improvement and Development	07	17,155				17,155	D
226	0607143A	Unmanned Aircraft System Universal Products	07	7,743				7,743	D
227	0607145A	Apache Future Development	07	77,177				77,177	D
228	0607150A	Intel Cyber Development	07	14,652			~	14,652	D
229	0607312A	Army Operational Systems Development	01	35,851				35,851	D
230	0607665A	Family of Biometrics	07	1,324				1,324	D
231	0607865A	Patriot Product Improvement	07	187,840				187,840	D
232	0203728A	Joint Automated Deep Operation Coordination System (JADOCS)	07	44,691				44,691	D
233	0203735A	Combat Vehicle Improvement Programs	07	268,919				268,919	D
234	0203743A	155mm Self-Propelled Howitzer Improvements	07	427,254				427,254	D
235	0203744A	Aircraft Modifications/Product Improvement Programs	07	11, 688				11,688	D
236	0203752A	Aircraft Engine Component Improvement Program	07	80				80	D
237	0203758A	Digitization	07	4,516				4,516	D
238	0203801A	Missile/Air Defense Product Improvement Program	07	1,288				1,288	D
239	0203802A	Other Missile Product Improvement Programs	07	79,424		2,300	2,300	81,724	D
240	0203808A	TRACTOR CARD	07						Þ
R-121	PB: FY 202	21 President's Budget (Published Versi	, (no.	as of January	, 17, 2020 at 11	1:58:58			
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Department of the Army FY 2021President's Budget Exhibit R-1 FY 2021 President's Budget Total Obligational Authority (Dollars in Thousands)

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

Line No	Program Element Number	Item	Act	FY 2019 (Base + OCO)	FY 2020 Base Enacted	FY 2020 Emergency	FY 2020 OCO Enacted	FY 2020 Total Enacted (Base+Emerg+ OCO)	n u u u
241	0205402A	Integrated Base Defense - Operational System Dev	07	8,000					D
242	0205410A	Materials Handling Equipment	07	1,132					D
243	0205412 A	Environmental Quality Technology - Operational System Dev	07	249	10,000			10,000	D
244	0205456A	Lower Tier Air and Missile Defense (AMD) System	07	74,295	97,746			97,746	Þ
245	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07	113,471	117,294			117,294	D
246	0208053A	Joint Tactical Ground System	07						D
248	0303028A	Security and Intelligence Activitie	s 07	40,002	13,845		12,904	26,749	D
249	0303140A	Information Systems Security Program	т 07	40,148	25,710			25,710	D
250	0303141A	Global Combat Support System	07	51,415	60,076			60,076	D
251	0303142A	SATCOM Ground Environment (SPACE)	07						D
252	0303150A	WWMCCS/Global Command and Control System	07	1,966	2,073			2,073	Ð
255	0305172A	Combined Advanced Applications	07	1,500					Þ
256	0305179A	Integrated Broadcast Service (IBS)	07	450	459			459	Þ
257	0305204A	Tactical Unmanned Aerial Vehicles	07	6,000	5,097		17,050	22,147	D
258	0305206A	Airborne Reconnaissance Systems	07	26,416	11,177		2,000	13,177	D
259) 0305208A	Distributed Common Ground/Surface Systems	01	27,109	28,821			28,821	D
260	D305219A	MQ-1C Gray Eagle UAS	07		5,000			5,000	D
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Department of the Army FY 2021President's Budget Exhibit R-1 FY 2021 President's Budget Total Obligational Authority (Dollars in Thousands)

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

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

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

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

S	ο c	10	Þ	Þ	D	D	D	D	D		D		
FY 2020 Total Enacted	(Base+Emerg+		3,218	7,817	4,214	108,348	34,169	7,677	7,273	1,878,294			12,690,739
	EY 2020 OCO Enacted				2,214					34,168			147,304
	FY 2020 Fmergency	[)											
	FY 2020 Base Enarted		3,218	7,817	2,000	108,348	34,169	7,677	7,273	1,844,126			12,543,435
	FY 2019 (Base + OCO)		6,180	17,863	6, 524	106,766	9,927	7,400	5,955	1,721,365			11,371,268
	404		07	07	07	07	07	07			08	jram	
	T tem		RQ-11 UAV	RQ-7 UAV	Biometrics Enabled Intelligence	End Item Industrial Preparedness Activities	SATCOM Ground Environment (SPACE)	Joint Tactical Ground System	9 Classified Programs	ational Systems Development	Defensive CYBER - Software Prototype Development	ware and Digital Technology Pilot Prog	, Development, Test & Eval, Army
Program	ine Element		261 0305232A	262 0305233A	263 0307665A	264 0708045A	265 1203142A	266 1208053A	5666666666666666	Opera	267 0608041A	Softw	otal Research,
	- T	4 0.40							6				Ĕ

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

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

ပဖလ		D	D	Þ	Ð	Þ	D	Þ		D		
FY 2021 Total (Base + OCO)					61,012			3, 983	2,073,881	46,445	46,445	12,770,167
FY 2021 Total OCO									75, 342			182,824
FY 2021 OCO for Direct War and Enduring Costs									75,342			182,824
FY 2021 OCO for Base Requirements												
FY 2021 Base					61,012			3, 983	1,998,539	46,445	46,445	12,587,343
Act	ł.	07	07	07	07	07	07			08	gram	
Item		RQ-11 UAV	RQ-7 UAV	Biometrics Enabled Intelligence	End Item Industrial Preparedness Activities	SATCOM Ground Environment (SPACE)	Joint Tactical Ground System	9 Classified Programs	ational Systems Development	Defensive CYBER - Software Prototype Development	ware and Digital Technology Pilot Pro	, Development, Test & Eval, Army
Program : Element Number		0305232A	0305233A	3 0307665A	1 0708045A	1203142A	5 1208053A	566666666666666	Opera	/ 0608041A	Softw	I Research,
Line No	ł	261	262	263	264	265	266	5666		267		Tota

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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
78	04	0603305A	Army Missle Defense Systems Integration	1
79	04	0603308A	Army Space Systems Integration	18
80	04	0603327A	Air and Missile Defense Systems Engineering	30
81	04	0603619A	Landmine Warfare and Barrier - Adv Dev	39
82	04	0603627A	Smoke, Obscurant and Target Defeating Sys-Adv Dev	67
83	04	0603639A	Tank and Medium Caliber Ammunition	75
84	04	0603645A	Armored System Modernization - Adv Dev	162
85	04	0603747A	Soldier Support and Survivability	174
86	04	0603766A	Tactical Electronic Surveillance System - Adv Dev	197
87	04	0603774A	Night Vision Systems Advanced Development	212
88	04	0603779A	Environmental Quality Technology - Dem/Val	233
89	04	0603790A	NATO Research and Development	250
90	04	0603801A	Aviation - Adv Dev	262
91	04	0603804A	Logistics and Engineer Equipment - Adv Dev	278
92	04	0603807A	Medical Systems - Adv Dev	317
93	04	0603827A	Soldier Systems - Advanced Development	355

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Line # **Budget Activity Program Element Number Program Element Title** Page 94 04 0604017A 95 04 0604020A 96 04 0604021A Electronic Warfare Technology Maturation (MIP)...... 434 97 04 0604035A 98 04 0604100A 99 04 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4)..... 456 04 0604113A Future Tactical Unmanned Aircraft System (FTUAS)...... 465 100 101 04 0604114A 102 04 0604115A 103 04 0604117A 104 04 0604118A 0604119A 105 04 106 04 0604120A 0604121A 107 04 0604134A 108 04 109 04 0604182A 110 04 0604319A 04 0604403A 111

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Budget Activity Program Element Number **Program Element Title** Line # Page 112 04 0604541A 0604644A 113 04 Integrated Base Defense (Budget Activity 4)...... 671 0604785A 114 04 115 04 0305251A 116 04 1206120A 117 04 1206308A

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

Program Element Title	Program Element Number	Line #	ВА	Page
Air and Missile Defense Systems Engineering	0603327A	80	04	30
Analysis Of Alternatives	0604100A	98	04	450
Armored System Modernization - Adv Dev	0603645A	84	04	162
Army Advanced Component Development & Prototyping	0604119A	105	04	558
Army Missle Defense Systems Integration	0603305A	78	04	1
Army Space Systems Integration	0603308A	79	04	18
Army Space Systems Integration	1206308A	117	04	
Assured Positioning, Navigation and Timing (PNT)	0604120A	106	04	559
Assured Positioning, Navigation and Timing (PNT)	1206120A	116	04	688
Aviation - Adv Dev	0603801A	90	04	262
Counter Improvised-Threat Demonstration, Prototype Development, and Testing	0604134A	108	04	604
Cross Functional Team (CFT) Advanced Development & Prototyping	0604020A	95	04	428
Cyberspace Operations Forces and Force Support	0305251A	115	04	677
Electronic Warfare Technology Maturation (MIP)	0604021A	96	04	434
Environmental Quality Technology - Dem/Val	0603779A	88	04	233
Future Interceptor	0604403A	111	04	627
Future Tactical Unmanned Aircraft System (FTUAS)	0604113A	100	04	

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Program Element Title	Program Element Number	Line #	ВА	Page
Hypersonics	0604182A	109	04	613
Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	0604319A	110	04	620
Integrated Base Defense (Budget Activity 4)	0604785A	114	04	671
Landmine Warfare and Barrier - Adv Dev	0603619A	81	04	39
Logistics and Engineer Equipment - Adv Dev	0603804A	91	04	278
Low Earth Orbit (LEO) Satellite Capability	0604035A	97	04	443
Lower Tier Air Missile Defense (LTAMD) Sensor	0604114A	101	04	475
Maneuver - Short Range Air Defense (M-SHORAD)	0604117A	103	04	547
Medical Systems - Adv Dev	0603807A	92	04	317
Mobile Medium Range Missile	0604644A	113	04	665
NATO Research and Development	0603790A	89	04	250
Night Vision Systems Advanced Development	0603774A	87	04	212
Robotics Development	0604017A	94	04	394
Small Unmanned Aerial Vehicle (SUAV) (6.4)	0604101A	99	04	456
Smoke, Obscurant and Target Defeating Sys-Adv Dev	0603627A	82	04	67
Soldier Support and Survivability	0603747A	85	04	174
Soldier Systems - Advanced Development	0603827A	93	04	355
Synthetic Training Environment Refinement & Prototyping	0604121A	107	04	589
TRACTOR BEAM	0604118A	104	04	557

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Program Element Title	Program Element Number	Line #	BA Page
Tactical Electronic Surveillance System - Adv Dev	0603766A	86	04 197
Tank and Medium Caliber Ammunition	0603639A	83	04
Technology Maturation Initiatives	0604115A	102	04 483
Unified Network Transport	0604541A	112	04

Exhibit R-2, RDT&E Budget Iten	n Justificat	i on: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACE	ation, Army 0&P)	/ BA 4: <i>Adv</i>	anced	R-1 Progr a PE 060330	am Element 05A / Army N	t (Number / /issle Defe	Name) nse System	s Integratio	n		
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	-	60.301	59.487	11.062	-	11.062	11.651	11.687	12.313	12.552	0.000	179.053
FG6: Missile Defense (CA)	-	49.700	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	49.700
TR5: Missile Defense Battlelab	-	10.601	59.487	11.062	-	11.062	11.651	11.687	12.313	12.552	0.000	129.353

A. Mission Description and Budget Item Justification

This Program Element (PE) funds missile defense systems integration efforts for both the US Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT) and USSPACECOM.

USASMDC/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC/ARSTRAT as the Army proponent for ground-based midcourse defense (GMD), the Army integrator for global missile defense, and the Army Service Component Command (ASCC) of the U.S. Strategic Command (USSTRATCOM). Army Regulation (AR) 10-87 Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007 and AR 5-22 The Army Force Modernization Proponent System dated 19 August 2009 designates USASMDC/ARSTRAT as the Army specified proponent for Global Missile Defense capabilities. As the Army proponent for GMD, USASMDC/ARSTRAT is responsible for developing warfighting concepts, conducting warfighting experiments to validate those concepts, identifying capabilities needed to implement the validated concepts, and developing Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions to realize the GMD capabilities. As the Army integrator for global missile defense, USASMDC/ARSTRAT is responsible for reviewing programs managed by the Army, other Services, Defense agencies and National agencies to ensure that they are correctly synchronized and will ultimately provide the capabilities required by USSTRATCOM to execute its global missile defense responsibilities.

<u>FY 2019</u>	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
60.472	10.987	10.947	-	10.947
60.301	59.487	11.062	-	11.062
-0.171	48.500	0.115	-	0.115
-	-			
-	-			
-	-			
-	48.500			
-	-			
-0.171	-			
-	-			
-	-	0.115	-	0.115
	FY 2019 60.472 60.301 -0.171 - - - - - - - - - - 0.171 - - -	FY 2019 FY 2020 60.472 10.987 60.301 59.487 -0.171 48.500 - -	FY 2019 FY 2020 FY 2021 Base 60.472 10.987 10.947 60.301 59.487 11.062 -0.171 48.500 0.115 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 0.115	FY 2019 FY 2020 FY 2021 Base FY 2021 OCO 60.472 10.987 10.947 - 60.301 59.487 11.062 - -0.171 48.500 0.115 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 0.115 -

khibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date	: February 202	0
opropriation/Budget Activity)40: Research, Development, Test & Evaluation, Army I BA 4: Advanced omponent Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603305A <i>I Army Missle Defense Systems Integration</i>		
Congressional Add Details (\$ in Millions, and Includes General R	eductions)	FY 2019	FY 2020
Project: FG6: Missile Defense (CA)		÷	
Congressional Add: Missile Defense (CA)		49.700	-
	Congressional Add Subtotals for Project: FG6	49.700	-
Project: TR5: Missile Defense Battlelab			
Congressional Add: Conventional Mission Capabilities		-	3.000
Congressional Add: Hypersonic Advanced Technology Testbed		-	15.000
Congressional Add: Integrated Environmental Control and Power	·	-	8.000
Congressional Add: Pragmatic Artificial Intelligence and new Tech	hnology Laboratory	-	7.500
Congressional Add: Hypersonic Testing and Related Technology	Development	-	15.000
	Congressional Add Subtotals for Project: TR5	-	48.500
	Congressional Add Totals for all Projects	49.700	48.500

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army									Date: February 2020			
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) Project (Number/Name) PE 0603305A I Army Missle Defense FG6 I Missile Defense (CA) Systems Integration FG6 I Missile Defense (CA)											
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
FG6: Missile Defense (CA)	-	49.700	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	49.700
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project focuses on four major efforts: 1) High Power Microwave Lethality Prototype testing, testing and modeling will be performed to ascertain the vulnerabilities of critical electrical circuits and components in order to attack adversary systems, such as unmanned aerial systems, and to protect U.S. assets and infrastructure in use by the Warfighter; 2) Advanced Electronic/Environmental Control Unit Thermal Management Prototypes of different sizes will be built and tested to reduce the magnitude of fuel used at forward operating bases consumed by environmental control units to keep major electronic systems cool in austere environments. Prototypes will be used to fully evaluate distributed cooling and legacy approaches; 3) Technology Complex Compound Materials for Thermal/Energy Management prototypes will be manufactured and tested for suitability in high velocity impacts. The planned compound is Coordinative Molecular Bond Armor Material and has potential to provide ballistics and thermal protection; 4) Upgrades are planned for the Advanced Measurement Optical Range facility to support laser radar development and testing; 5) HardWare-In-the-Loop (HWIL) for both open-loop device characterization and closed-loop dynamic hardware-in-the-loop simulation to characterize guidance and track-loop performance. Simulate trajectories, and engagement would be utilized to drive the HWIL simulations (e.g. 3DOF, 6DOF); 6) Integration of a Fire Control (FC) for the near-term Long-Range Weapon System requirements for initial operational capability. Long range hypersonic weapon analysis, integration and fielding support.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020
Congressional Add: Missile Defense (CA)	49.700	-
FY 2019 Accomplishments: Missile Defense (CA)		
Congressional Adds Subtotals	49.700	-

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

N/A

<u>Remarks</u>

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Pro PE 060 System	ogram Ele 3305A I A Is Integrat	ement (N Army Miss tion	umber/N sle Defens	ame) Se	Project FG6 / N	(Number lissile Der	r/ Name) fense (CA ₎)	
Management Service	s (\$ in M	illions)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 OC	2021 CO	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
Management Support	SS/CPFF	Huntsville : Huntsville	3.303	-		-		-		-		-	0.000	3.303	_
		Subtotal	3.303	-		-		-		-		-	0.000	3.303	N/A
Product Developmen	it (\$ in Mi	illions)		FY 2	2019	FY	2020	FY 2 Ba	2021 Ise	FY 2 OC	2021 CO	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
High Power Microwave Lethality	SS/CPFF	Radiance : Huntsville	3.900	10.000		-		-		-		-	0.000	13.900	-
Advanced Electronic/ Environmental Control Unit Thermal Management Prototype	SS/CPAF	Rocky Research : Huntsville	28.000	15.000		-		-		-		-	0.000	43.000	-
Technology Complex Compound Materials for Thermal/Energy Management Prototype	SS/CPFF	Radiance : huntsville	2.250	-		-		-		-		-	0.000	2.250	-
Advanced Measurement Optical Range Facility Upgrades	SS/CPFF	Radiance : Huntsville	6.194	-		-		-		-		-	0.000	6.194	-
HWIL Scene Generation and Software Development Lab	SS/CPFF	People Tech : Huntsville	-	8.700		-		-		-		-	0.000	8.700	-
HWIL Environmental Simulators	SS/CPFF	Hill Technologies : Huntsville	-	11.000		-		-		-		-	0.000	11.000	-
Long Ranage Weapons Analysis	SS/CPFF	Radiance : Huntsville	-	5.000		-		-		-		-	0.000	5.000	-
		Subtotal	40.344	49.700		-		-		-		-	0.000	90.044	N/A
						<u> </u>					<u> </u>	,			

Exhibit R-3, RDT&E F	Project Co	ost Analysis: PB 2	2021 Army	/								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4						R-1 Pro PE 0603 System	gram Ele 3305A I A s Integrat	ement (N Army Miss tion	l umber/N sle Defens	ame) Se	Project FG6 / N	(Number lissile Def	r/ Name) Tense (CA))	
Support (\$ in Million	s)			FY 2	FY 2019 FY 2020 FY 2021 FY 2021 FY FY 2019 FY 2020 Base OCO T				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
High Power Microwave Lethality Prototype	SS/CPFF	Georgia Tech : Georgia	0.203	-		-		-		-		-	0.000	0.203	-
Advanced Meaasurement Optical Range Facility Upgrade	SS/CPFF	Huntsville : Huntsville	0.150	-		-		-		-		-	0.000	0.150	-
		Subtotal	0.353	-		-		-		-		-	0.000	0.353	N/A
			Prior Years	FY 2	2019	FY 2	020	FY 2 Ba	2021 ase	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	44.000	49.700		0.000		-		-		-	0.000	93.700	N/A

Remarks

hibit R-4, RDT&E Schedule Profile: PB 2021 A	۲my	ý																	1			Date	e: Fe	bru	ary	2020)	
ppropriation/Budget Activity 40 / 4								R-1 Program Element (Number/Name)Project (PE 0603305A / Army Missle DefenseFG6 / MisSystems IntegrationFG6 / Mis							(Number/Name) lissile Defense (CA)													
		FY	2012	2		FY	2013	3		FY	2014			FY 2	2015			FY 2	2016	6		FY 2	2017	1		FY 2	2018	}
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Advanced Measurement Optical Range Facility Upgrades																												
		FY	201	9		FY	2020)		FY	2021			FY 2	2022	2		FY 2	2023	3		FY 2	2024			FY 2	2025	;
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Upgrades																												

Appropriation/Budget Activity				Date: Febru	ary 2020		
2040 / 4	R-1 Progra PE 060330 <i>Systems Ir</i>	am Element (Number/ 05A I Army Missle Defen ntegration	Name) nse	Project (Number/Name) FG6 / Missile Defense (CA)			
	Schedule Def	tails					
		Star	ť	En	End		
Events		Quarter	Year	Quarter	Year		
Advanced Measurement Optical Range Facility Upgrad	les	2	2018	4	2018		

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army									Date: Febr				
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060330 Systems Ir	am Elemen)5A / Army / ntegration	t (Number/ Missle Defe	Project (N TR5 / Miss	e ct (Number/Name) Missile Defense Battlelab				
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	
TR5: Missile Defense Battlelab	-	10.601	59.487	11.062	-	11.062	11.651	11.687	12.313	12.552	0.000	129.353	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

This Project TR5 funds United States Army Space and Missile Defense Command/ Army Strategic Command (USASMDC/ARSTRAT) efforts to develop the associated operational prototyping, experimentation, operational analysis, and modeling and simulation in support of missile defense capabilities for current and future Forces.

USASMDC/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC/ARSTRAT as the Army proponent for ground-based midcourse defense (GMD), the Army integrator for global missile defense, and the Army Service Component Command (ASCC) of the U.S. Strategic Command (USSTRATCOM). Army Regulation (AR) 10-87 Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007 and AR 5-22 The Army Force Modernization Proponent System dated 19 August 2009 designates USASMDC/ARSTRAT as the Army specified proponent for Global Missile Defense. As the Army proponent GMD, USASMDC/ARSTRAT is responsible for developing warfighting concepts, conducting warfighting experiments to validate those concepts, identifying capabilities needed to implement the validated concepts, and developing Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions to realize the GMD capabilities. As the Army integrator for global missile defense, USASMDC/ ARSTRAT is responsible for reviewing programs managed by the Army, other Services, Defense agencies and National agencies to ensure that they are correctly synchronized and will ultimately provide the capabilities required by USSTRATCOM to execute its global missile defense responsibilities.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Prototypes	6.359	6.556	6.694
Description: Funding is provided for the following efforts: continue to evaluate new technologies in realistic operating environments. This is accomplished by participating in and providing support to Unified Quest wargames and experiments to analyze and integrate technology to identify the feasibility integration into Army missile defense systems. The Space and Missile Defense Command will participate and support biennial rewrites of Army Capstone, Operational and Functional Concepts. Continue to provide operational manager support to STRATCOM, NORTHCOM and SOCOM Joint Technical Capability Demonstrations to ensure Army missile defense equities are represented in advanced technology developments by demonstrating military utility when applied to military equipment and techniques. Examples include: supporting multi service experiments and capability development of the national-directed Phased Adaptive Approach (PAA) for Ballistic Missile Defense (BMD) as it is applied to each of the regional COCOMs; Developing effective Integrated Missile Defense concepts for Army support to the Phased Adaptive Approach (PAA) being implemented within each regional COCOM. A focus area will be informing the Missile Defeat Integrated Capability Development Working Group with experimentation on improving the timeliness and effectiveness of counter ballistic missile time sensitive targeting. Another project is developing and implementing a training environment for cyber defenders to train on defense of the GMD fire control networks through innovative scenario based training environments. Continue			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020)	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A <i>I Army Missle Defense</i> <i>Systems Integration</i>	Projec TR5 /	ct (Number/N Missile Defer	lame) nse Battlelab	
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2019	FY 2020	FY 2021
to support TRADOC proponents with their responsibilities relative to doctrine, or and education, personnel, and facilities (DOTMLPF-P) plus related matters to or Capabilities Integration and Development System (JCIDS), Science and Techr Development. Provide Government program management and oversite for DO defense-related programs for which USASMDC/ARSTRAT is the Army's proporthe Army Navy/Transportable Radar Surveillance and Control Model 2 (AN/TP' specific applications of the Command and Control, Battle Management and Co program management and oversite for National Capital Region?s Integrated Ai	organization, training, material, leader develop continue missile defense proponent input to Jo nology, Concept Development, and Capability TMLPF-P development and analysis for missil onent - Ground-based Midcourse Defense System Y-2) Forward-based Mode Radar (FBM), and Jo mmunications program. Provide Government ir Defense System.	ment iint e tem, Army-			
FY 2020 Plans: Take the lessons learned from the FY 2019 efforts to continue to evaluate new This is accomplished by participating in and providing support to Unified Quest integrate technology to identify the feasibility integration into Army missile defe Command will participate and support biennial rewrites of Army Capstone, Ope provide operational manager support to STRATCOM, NORTHCOM and SOCC ensure Army missile defense equities are represented in advanced technology when applied to military equipment and techniques. Examples include: support development of the national-directed Phased Adaptive Approach (PAA) for Bal of the regional COCOMs; Developing effective Integrated Missile Defense cond Approach (PAA) being implemented within each regional COCOM. A focus are Capability Development Working Group with experimentation on improving the missile time sensitive targeting. Another project is developing and implementin train on defense of the GMD fire control networks through innovative scenario I TRADOC proponents with their responsibilities relative to doctrine, organization education, personnel, and facilities (DOTMLPF-P) plus related matters to conti Capabilities Integration and Development System (JCIDS), Science and Techr Development. Provide Government program management and oversite for DO defense-related programs for which USASMDC/ARSTRAT is the Army's propor the Army Navy/Transportable Radar Surveillance and Control Model 2 (AN/TP' specific applications of the Command and Control, Battle Management and Co program management and oversite for National Capital Region?s Integrated Ai by USASMDC / ARSTRAT, Future Warfare Center. FY 2021 Plans:	technologies in realistic operating environmer wargames and experiments to analyze and nse systems. The Space and Missile Defense erational and Functional Concepts. Continue to DM Joint Technical Capability Demonstrations developments by demonstrating military utility ting multi service experiments and capability listic Missile Defense (BMD) as it is applied to cepts for Army support to the Phased Adaptive a will be informing the Missile Defeat Integrate timeliness and effectiveness of counter ballist g a training environment for cyber defenders to based training environments. Continue to supp n, training, material, leader development and nue missile defense proponent input to Joint hology, Concept Development, and Capability TMLPF-P development and analysis for missil onent - Ground-based Midcourse Defense Syst Y-2) Forward-based Mode Radar (FBM), and A mmunications program. Provide Government ir Defense System. These funds will be execu	nts. o to c each ed ic o oort e tem, Army- ited			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A <i>I Army Missle Defense</i> <i>Systems Integration</i>	Projec TR5 /	ct (Number/N Missile Defer	l ame) ise Battlelab	
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2019	FY 2020	FY 2021
Take the lessons learned from the FY 2020 efforts to continue to evaluate new This is accomplished by participating in and providing support to Unified Quest integrate technology to identify the feasibility integration into Army missile defers Command will participate and support biennial rewrites of Army Capstone, Ope to provide operational manager support to USSTRATCOM, USNORTHCOM and Demonstrations to ensure Army missile defense equities are represented in ad military utility when applied to military equipment and techniques. Examples include and capability development of the national-directed Phased Adaptive Approach it is applied to each of the regional CCMDs; developing effective Integrated Miss Phased Adaptive Approach (PAA) being implemented within each regional CC Missile Defeat Integrated Capability Development Working Group formed in FY at on further improving the timeliness and effectiveness of counter ballistic miss to TRADOC proponents with their responsibilities relative to doctrine, organizate education, personnel, facilities and policy (DOTMLPF-P) plus related matters to Joint Capabilities Integration and Development System (JCIDS), Science and T Development. Provide Government program management and oversight for DC defense-related programs for which USASMDC/ARSTRAT is the Army's propor the Army Navy/Transportable Radar Surveillance and Control, Battle Management as support to Ground-based Midcourse Defense (GMD) Missile Field #4 (MF4) de recapitalized MEP-810C generator fielding and radar site power conversion activand oversite for National Capital Region's Integrated Air Defense System. These funds will be executed by USASMDC / ARSTRAT, Future Warfare Cent	technologies in realistic operating environmen wargames and experiments to analyze and inse systems. The Space and Missile Defense erational and Functional Concepts. Continue ind USSOCOM Joint Technical Capability vanced technology developments by demonstra- clude: supporting multi service experiments in (PAA) for Ballistic Missile Defense (BMD) as asile Defense concepts for Army support to the MD. A focus area will be improving upon the 7 2020 with additional experimentation aimed sile time sensitive targeting. Continue support tion, training, material, leader development and continue missile defense proponent input to Fechnology, Concept Development, and Capab DTMLPF-P development and analysis for missi nent - Ground-based Midcourse Defense Syster Y-2) Forward-based Mode Radar (FBM), and and Communications program. Specifically, pro- velopment and construction. Provide support tivities in USINDOPACOM AOR. Provide Harco JCOM AORs and continue to support C2BMC rities. Provide Government program managem er in FY 2021.	ts. rating bility ile em, bvide to lened ient			
FY 2020 to FY 2021 Increase/Decrease Statement: Adjustment to economic assumptions.					
Title: Analysis, and Models and Simulations (M&S)		T	4.242	4.245	4.368
Description: Funding is provided for the following efforts: evaluate new technowill be accomplished by supporting ongoing efforts that provide the most realist technology gap and cost reduction analysis of missile defense systems. Realist determine the ability of the specific technologies to fill capability gaps in terms of technologies technologies to fill capability gaps in terms of technologies	blogies in realistic operating environments. This tic operating environment available to perform tic operating environments will be available to of utility to the warfighter. Support of technolog	s y			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020							
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A <i>I Army Missle Defense</i> <i>Systems Integration</i>	Project (Number TR5 / Missile Defe	/ Name) ense Battlelab				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021			
demonstrations, Analysis and Demonstration Tools/Test Beds for evolving miss needs and continue to be expanded to ensure that advanced technology develor capabilities. The Space and Missile Defense Center of Excellence (SMD CoE) we maintenance, sustainment, and development for Extended Air Defense Simulat synthetic operating environment to provide the capability to perform system and exercise/ experimentation support. The SMD CoE will continue to provide progra and development for Reconfigurable Tactical Operations Simulator (RTOS) delig missile defense simulation in distributed exercises and experiments. The FWC of for maintenance, sustainment, and development for the Joint Embedded Messa application that enables communications between disparate systems, protocols	ile defense concepts will address emerging opment can adequately enhance missile defer will continue to provide program management ion (EADSIM) delivering the required high fide d cost benefit analysis, operational planning, a am management for maintenance, sustainme ivering operator in the loop capability for air ar will continue to provide program management aging System (JEMS) providing data translation and architectures.	nse for elity nd nt, nd n					
FY 2020 Plans: Take the lessons learned from the FY 2019 efforts and evaluate new technolog accomplished by supporting ongoing efforts that provide the most realistic operating ap and cost reduction analysis of missile defense systems. Realistic operating ability of the specific technologies to fill capability gaps in terms of utility to the version Analysis and Demonstration Tools/Test Beds for evolving missile defense concerts be expanded to ensure that advanced technology development can adequate Future Warfare Center (FWC) will continue to provide program management for Extended Air Defense Simulation (EADSIM) delivering the required high fidelity capability to perform system and cost benefit analysis, operational planning, and continue to provide program management for maintenance, sustainment, and d Simulator (RTOS) delivering operator in the loop capability for air and missile defense the Joint Embedded Messaging System (JEMS) providing data translation applied isparate systems, protocols and architectures. These funds will be executed be EX 2021 Plans :	ies in realistic operating environments. This wating environment available to perform technology environments will be available to determine to varfighter. Support of technology demonstration epts will address emerging needs and continuely enhance missile defense capabilities. The realistence, sustainment, and development synthetic operating environment to provide the development for Reconfigurable Tactical Operates simulation in distributed exercises and enance, sustainment, and development for for the development for get simulation in distributed exercises and enance, sustainment, and development for ication that enables communications between by USASMDC / ARSTRAT, Future Warfare Certain Communication and the strate of	ill be logy ne ons, e t for e C will ations					
FY 2021 Plans: Take the lessons learned from the FY 2020 efforts and evaluate new technolog will be accomplished by supporting ongoing efforts that provide the most realistic technology gap and cost reduction analysis of missile defense systems. Realist determine the ability of the specific technologies to fill capability gaps in terms of demonstrations, Analysis and Demonstration Tools/Test Beds for evolving miss needs and continue to be expanded to ensure that advanced technology development.	ies in realistic operating environments. This ic operating environment available to perform ic operating environments will be available to of utility to the warfighter. Support of technolog ile defense concepts will address emerging opment can adequately enhance missile defer	y ise					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Da	ate: F	ebruary 2020)			
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603305A <i>I Army Missle Defense</i> <i>Systems Integration</i>	Number/Name)Project (Number/Name)sle DefenseTR5 / Missile Defense Battlelab							
B. Accomplishments/Planned Programs (\$ in Millions)			FY 20	019	FY 2020	FY 2021			
capabilities. The Space and Missile Defense Center of Excellence (SMD CoE) maintenance, sustainment, and development for Extended Air Defense Simula synthetic operating environment to provide the capability to perform system an exercise/ experimentation support. The SMD CoE will continue to provide prog and development for Reconfigurable Tactical Operations Simulator (RTOS) an Simulation (FFEADS) delivering operator in the loop capability for air and missi experiments. The SMD CoE will continue to provide program management for the Joint Embedded Messaging System (JEMS) providing data translation app disparate systems, protocols and architectures. These funds will be executed by	will continue to provide program management tion (EADSIM) delivering the required high d cost benefit analysis, operational planning ram management for maintenance, sustain d Future Force Experimentation Air Defense le defense simulation in distributed exercise maintenance, sustainment, and development lication that enables communications betwee by USASMDC SMD CoE.	ent for fidelity J, and ment, es and nt for en							
FY 2020 to FY 2021 Increase/Decrease Statement: Adjustment to economic assumptions.									
Title: FY 2020 SBIR/STTR Transfer				-	0.186	-			
Description: Funding transferred in accordance with Title 15 USC ?638									
<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 S	ubtotals	10	0.601	10.987	11.062			
	FY 201	9 FY 2	020						
Congressional Add: Conventional Mission Capabilities		- 3	3.000						
FY 2020 Plans: Conventional Mission Capabilities									
Congressional Add: Hypersonic Advanced Technology Testbed		- 15	5.000						
FY 2020 Plans: Hypersonic Advanced Technology Testbed									
Congressional Add: Integrated Environmental Control and Power		- 8	3.000						
FY 2020 Plans: Integrated Environmental Control and Power									
Congressional Add: Pragmatic Artificial Intelligence and new Technology Lab	poratory	- 7	7.500						
Exhibit R-2A, RDT&E Project Justification: PB 2021 Army				Date: February 2020					
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Appropriation/Budget Activity R-1 Program E 2040 / 4 PE 0603305A / Systems Integr	Element (Number/ I Army Missle Defe ration	Project (N TR5 / Miss	umber/Name) ile Defense Battlelab						
		FY 2019	FY 2020						
FY 2020 Plans: Pragmatic Artificial Intelligence and new Technology Laboratory									
Congressional Add: Hypersonic Testing and Related Technology Development		-	15.000						
FY 2020 Plans: Hypersonic Testing and Related Technology Development									
Congressiona	al Adds Subtotals	-	48.500						
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A									

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	/ 2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 System	o gram El 3305A I A s Integra	ement (N Army Miss tion	umber/N sle Defens	ame) se	Project TR5 / N	t (Numbe Aissile Dei	r/ Name) ^f ense Bat	tlelab	
Management Service	es (\$ in M	lillions)		FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 O(2021 CO	FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Personnel and Operations Support	C/TBD	To Be determined : To be Determined	-	9.364		7.196		7.307		-		7.307	0.000	23.867	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.186		-		-		-	0.000	0.186	-
		Subtotal	-	9.364		7.382		7.307		-		7.307	0.000	24.053	N/A
Product Developmer	nt (\$ in M	illions)	ſ	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 O(2021 CO	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
Contracts	Various	To Be Determined : To Be determined	1.156	1.237		3.667		3.755		-		3.755	0.000	9.815	-
Various	Various	To be determined : to be determined	-	-		48.438		-		-		-	0.000	48.438	-
		Subtotal	1.156	1.237		52.105		3.755		-		3.755	0.000	58.253	N/A
Support (\$ in Million	s)		ſ	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 O(2021 CO	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
Experiments & technology enhancements of prototypes/tools and analysis.	Various	Various Colorado Springs CO and Huntsville AL : Alabama, Colorado Springs	117.427	-		-		-		-		-	Continuing	Continuing	Continuing
Govt Support and Support Contracts	Various	Various Colorado Springs CO and Huntsville AL : Alabama, Colorado Springs	138.783	-		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	256.210	-		-		-		-		-	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2							Date:	Date: February 2020				
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603305A / Army Missle Defense Systems Integration				Project (Number/Name) TR5 / Missile Defense Battlelab			
Prior Years FY 2019				FY 20)20	FY 2021 Base	FY 2 OC	021 O	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	257.366	10.601		59.487		11.062	-		11.062	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy					Date: February	2020	
Appropriation/Budget Activity 2040 / 4		F ۲ ۲	Project (N TR5 / Mis	t (Number/Name) Missile Defense Battlelab				
–	FY 2019	FY 202	0 FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	
Event Name	1 2 3 4	1 2 3	4 1 2 3 4	4 1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	
Experiments & technology enhancements of prototypes	Eval integration of tech id	entified in Wargame	e Campaign Plan and Analysis	12-14				
Development of Extended Air Defense Simulation Updates	-							
Reconfigurable Tactical Operations System (RTOS) Developme								
JFCC-Integrated Missile Defense Operational Analysis								
Analysis Support to JIAMDO								
AN/TPY-2 FBM Transition from MDA to Army								
Missile Defense Simulation Suppt to TRADOC ARCIC Experime								
Force Design Requirements Assessment for Missile Defense Fo								

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Febru	uary 2020
Appropriation/Budget Activity 040 / 4	R-1 Program Element (Number PE 0603305A <i>I Army Missle Defe</i> <i>Systems Integration</i>	(Name) ense	Project (Number/Nam TR5 / Missile Defense	e) Battlelab
Scl	hedule Details			
	Sta	rt	Er	nd
Events	Quarter	Year	Quarter	Year
Experiments & technology enhancements of prototypes	1	2018	4	2023
Development of Extended Air Defense Simulation Updates	1	2018	4	2023
Reconfigurable Tactical Operations System (RTOS) Development	1	2018	4	2023
JFCC-Integrated Missile Defense Operational Analysis	1	2018	4	2023
High Energy Laser for AMD	1	2015	4	2018
Analysis Support to JIAMDO	1	2018	4	2023
AN/TPY-2 FBM Transition from MDA to Army	1	2018	4	2023
Missile Defense Simulation Suppt to TRADOC ARCIC Experimentation	1	2018	4	2023
Force Design Requirements Assessment for Missile Defense Forces	1	2018	4	2023
Allied and Partner Modeling to Inform Integration Efforts to Meet Objective	es 3	2016	4	2018
Pacific Focused-Adversary Centric Bundled	3	2016	4	2018
Inert Debris Analysis	3	2017	2	2018
Hypersonics Analysis	2	2017	4	2018

Exhibit R-2, RDT&E Budget Item	t ion: PB 202							Date: Febr	uary 2020			
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0603308A <i>I Army Space Systems Integration</i>							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2025	Cost To Complete	Total Cost			
Total Program Element	-	0.000	0.000	26.230	-	26.230	18.775	17.484	18.517	18.937	0.000	99.943
990: Space And Missile Defense Integration	-	0.000	0.000	26.230	-	26.230	18.775	17.484	18.517	18.937	0.000	99.943

A. Mission Description and Budget Item Justification

All Project FE5 funding is being transfer to Project 990 funding in FY2021

USASMDC/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC/ARSTRAT as the Army proponent for space, the Army integrator for global missile defense (GMD), and the Army Service Component Command (ASCC) of the USSTRATCOM. Army Regulation (AR) 10-87, Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007, and AR 5-22, The Army Force Modernization Proponent System, dated 19 August 2009, designated USASMDC/ARSTRAT as the Army specified proponent for Space/High Altitude capabilities. As the Army proponent for space and high altitude, USASMDC/ARSTRAT is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions.

The Friendly Force Data Integration and Management (FFDIM) Capability Definition Package (CDP), a Joint Capabilities Integration and Development System (JCIDS) requirements document (October 2017) validated the Joint Friendly Force Tracking (JFFT) Testbed's development, testing and integration capabilities and Friendly Force Tracking (FT) System Expert support provided by U.S. Army Space and Missile Defense Command (USASMDC) as U.S. Strategic Command's (USSTRATCOM's) Army Service Component Command (ASCC). In addition, Chairman of the Joint Chiefs of Staff Instruction 3910 (FFT Operations Guidance) directs USSTRATCOM's ASCC to execute eight specified FFT mission support responsibilities that include providing a testing and development capability to support joint, interagency and coalition partners FFT operations. USASMDC/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC/ARSTRAT as the Army proponent for space, the Army integrator for global missile defense (GMD), and the Army Service Component Command (ASCC) of the USSTRATCOM. Army Regulation (AR) 10-87, Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007, and AR 5-22, The Army Force Modernization Proponent System, dated 19 August 2009, designated USASMDC/ARSTRAT as the Army specified proponent for space and high altitude, USASMDC/ARSTRAT is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Ar	my			Date:	February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA Component Development & Prototypes (ACD&P)	R-1 Program El PE 0603308A / A	ement (Number/Name) Army Space Systems In	tegration		
B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	26.230	-	26.230
Total Adjustments	0.000	0.000	26.230	-	26.230
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	26.230	-	26.230

Change Summary Explanation

All Project FE5 funding transfers to Project 990 funding in FY2021.

USASMDC/ARSTRAT Future Warfare Center will execute \$20.957M of these funds in FY2021.

The APNT CFT will execute \$5.0M of these funds in FY2021.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 4 PE 0603308A / Army Space Systems 990 / Space Integration Integration 990 / Space						mber/Name) And Missile Defense Integration						
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
990: Space And Missile Defense Integration	-	0.000	0.000	26.230	-	26.230	18.775	17.484	18.517	18.937	0.000	99.943
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

This effort transitioned from 1206308A / FE5.

A. Mission Description and Budget Item Justification

USASMDC/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC/ARSTRAT as the Army proponent for space, the Army integrator for global missile defense (GMD), and the Army Service Component Command (ASCC) of the USSTRATCOM. Army Regulation (AR) 10-87, Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007, and AR 5-22, The Army Force Modernization Proponent System, dated 19 August 2009, designated USASMDC/ARSTRAT as the Army specified proponent for Space/High Altitude capabilities. As the Army proponent for space and high altitude, USASMDC/ARSTRAT is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions.

The Friendly Force Data Integration and Management (FFDIM) Capability Definition Package (CDP), a Joint Capabilities Integration and Development System (JCIDS) requirements document (October 2017) validated the Joint Friendly Force Tracking (JFFT) Testbed's development, testing and integration capabilities and Friendly Force Tracking (FFT) System Expert support provided by U.S. Army Space and Missile Defense Command (USASMDC) as U.S. Strategic Command's (USSTRATCOM's) Army Service Component Command (ASCC). In addition, Chairman of the Joint Chiefs of Staff Instruction 3910 (FFT Operations Guidance) directs USSTRATCOM's ASCC to execute eight specified FFT mission support responsibilities that include providing a testing and development capability to support joint, interagency and coalition partners FFT operations. USASMDC/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC/ARSTRAT as the Army proponent for space, the Army integrator for global missile defense (GMD), and the Army Service Component Command (ASCC) of the USSTRATCOM. Army Regulation (AR) 10-87, Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007, and AR 5-22, The Army Force Modernization Proponent System, dated 19 August 2009, designated USASMDC/ARSTRAT as the Army proponent for space and high altitude, USASMDC is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Architecture Development, War games and Demonstrations	-	-	11.945
Description: All Project FE5 funding is being transfer to Project 990 funding in FY 2021.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 202	0
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603308A <i>I Army Space Systems</i> <i>Integration</i>	Project (Number/ 990 / Space And N	Name) Iissile Defens	se Integration
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Funding is provided for planning, developing, and executing architectures and of space systems, space control capabilities, missile defense, and high altitude	combat development solutions for Army integ e systems.	ration		
FY 2021 Plans: USASMDC Space and Missile Defense Center of Excellence (SMDCOE) will of capability development efforts to enhance the resiliency and effectiveness of or and JCIDS capability development activities for space superiority, theater missi- technology for the full range of Navigation Warfare, tactical space layer, hyper SMDCoE will participate in robust campaign of learning with the Army, Army F wargaming, experimentation, live prototyping, studies, assessments, and exer concepts and technology described above. SMDCOE will provide support to P superiority and enhanced missile warning capabilities. A JTAGS Block III CDD meet advanced missile threats and to counter hypersonics. A high altitude CD a high altitude, multi-mission, persistent platform to provide resiliency for space Operational and Organizational Concept and Army Space concept will capture of learning and drive required capability development consistent with the Army (MDO) and CSA and Army Modernization Enterprise guidance for MDO capab CAPDEV, across the DOTMLPF-P, support will be provided to the APNT CFT tactical space layer and NAVWAR capabilities for situational awareness, assu	continue the full spectrum of JCIDS concept to critical space-based and space enabled assets sile warning, high altitude, and emerging conce- sonics, counter hypersonics, and directed ener- cutures Command, Joint and sister service rcises to learn, validate, develop, and integrate PEO IEWS and PEO M&S to acquire and field will be written to document the requirements for be based capabilities. A Theater Space Warfard the observations and insights from the campa y's Operating Concept of Multi-Domain Operat oble forces by 2028 and MDO ready forces by 2 to document the enduring requirements for the red PNT and PNT denial to our adversaries.	epts/ ergy. e the space to or e aign ions 2035. e		
FY 2020 to FY 2021 Increase/Decrease Statement: PE 1206308 FE5 FY 2020 funding transfers to Project 990 in FY 2021				
Title: Joint Friendly Force Tracking (J-FFT) Testbed		-	-	3.250
Description: All Project FE5 funding is being transfer to Project 990 funding in	n FY 2021.			
Joint-Friendly Force Tracking (J-FFT) division provides capabilities developmed Friendly Force Tracking (FFT) and Hostile Force Tagging, Tracking, and Locat Services, U.S. Government Agencies, Allies, and Coalition partners to support (C2), interoperability, fratricide prevention, and lethality projection. J-FFT development FFT, HF TTL and other Position Location Information (PLI) and C2 data into car operational pictures, and support development and deployment of requirement Major customers: SMDC Force Tracking Mission Management Center (FT MM Command (AFRICOM); Air Force Rapid Capabilities Office (AF RCO); Joint St	ent, sustainment, and technical support to the ting (HF TTL) efforts of Combatant Command t situational awareness (SA), command and co elops solutions at all classification levels to inte urrent and planned architectures, systems, an its to satisfy rapidly evolving Joint C2 requirem <i>I</i> (C); Special Operations Command (SOCOM); taff J6. J-FFT enables the FT MMC to suppor	ers, ontrol egrate d nents. Africa t: 59		

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020)		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603308A <i>I Army Space Systems</i> <i>Integration</i>	*) Project (Number/Name) 990 I Space And Missile Defense					
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2019	FY 2020	FY 2021		
device types; 22 data architectures; 518 user groups; over 146K registered device types; (911") alert reports/year. USSTRATCOM, in accordance with CJC three coordinating agencies for J-FFT within DoD. CJCSI 3910.01 directs eight USSTRATCOM SI 534-5 (reference V.6.) and annually published USSTRATCOM ARSTRAT as the lead USSTRATCOM component command for Friendly Force	vices; over 5M FFT reports/day; over 400 dist SI 3910.01 (reference V.4.) is designated one t Force Modernization tasks to USSTRATCON OM operations orders have designated USAS e Tracking (FFT).	ress of A. MDC/					
FY 2021 Plans: J-FFT Testbed supports SMDC Force Tracking Mission Management Center (I Africa Command (AFRICOM) Air Force Rapid Capabilities Office (AF RCO) Jo by providing agile capability development and integrated solutions to validated tracking data exchange and satisfy joint, agency and coalition warfighting need (COP) displays and decision making. JFFT development will continue to respo the number of device types, data types, and displays supported by the various Testbed is scheduled to develop and deliver new capabilities including comma data sources and devices, and the ratified NATO message standard for FFT. A at the Impact Level 2 (IL 2) (publicly releasable data), IL 5 (unclassified national and implementation of needed upgrades to the Force Tracking Web product, fur visualization and management. JFFT will continue to exploit, expand and provi at all classification levels that achieve improved performance and reduce costs support North Atlantic Treaty Organization Capability Team activities and other US and coalition FFT interoperability. USASMDC Space and Missile Defense Center of Excellence (SMDCOE) will e	FT MMC) Special Operations Command (SOG int Staff J6 and other U.S. Government agence requirements that enable interoperable force ds for timely, accurate Common Operational P and to the growth in FFT device use by enablin FFT and HF TTL data architectures. The JFF and and control messaging, new FFT and HF Also planned is the inclusion of cloud data serve al security data), and IL 6 (secret), and re-des ulfilling requirements for added functionality in ide mission owners with approved infrastructures. JFFT Testbed will remain a key contributor for r coalition assessments and exercises that ad execute these funds in FY 2021.	COM) ides icture g T TTL vices gn data res o vance					
FY 2020 to FY 2021 Increase/Decrease Statement: PE 1206308 FE5 FY 2020 funding transfers to Project 990 in FY 2021							
Title: Organizational Development as Part of the SRC40 Proponecy Mission			-	-	2.925		
Description: All Project FE5 funding is being transfer to Project 990 funding in	n FY 2021.						
Continue participation in the Force Design Update (FDU) process. Developmen Papers, Organization Design Papers, Cost Benefit Analyses, Unit Reference S (MARC) determination.	nt of Operational & Organizational (O&O) Cor Sheets (URS), and Manpower Requirements C	icept Criteria					
FY 2021 Plans:							

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020)
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603308A <i>I Army Space Systems</i> <i>Integration</i>	Projec 990 / 3	ct (Number/I Space And M	Name) Iissile Defens	se Integration
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2019	FY 2020	FY 2021
Continue to participate in the Force Design Update (FDU) process. The U.S. A (USASMDC) Space and Missile Defense Center of Excellence (SMDCoE) will gain HQDA approval of organizational structure changes and designs through the development of Operational & Organizational Concept Papers, Organizatio Reference Sheets, and Manpower Requirements Criteria determination. Partici Army's annual process to examine the projected Army force qualitatively and qualication development, Capability Demand Analysis and Resourcing phases to the future Program Objectives Memorandum (POM) Force. This is performed to demands and levels of funding/authorizations to build the POM Force. USASM Organization and Equipment (TOE) requirements documents conducted as part other Force Design processes (i.eBasis of Issue Plan (BOIP) Modernization P reviews, SSN-LIN Automated Management and Integrating System (SLAMIS) r BOIP Development is collection of processes including the cyclic review of Arm Feeder Data for USASMDC proponent item BOIPs, and validation of BOIP MO Forces Force Structure Review which is a Cost-Benefit Analysis-like structured Analysis, Gap Analysis, and Solutions Analysis to identify and document organ a prioritized list of those gaps, and identify potential materiel and/or non-materior.	army Space and Missile Defense Command participate in the recurring process used to the FDU and FDU Jr. processes. This includes n Design Papers, Cost Benefit Analyses, Unit ipate in the Total Army Analysis (TAA), the uantitatively. USASMDC will support TAA Rule o ensure SRC40 units are properly accounted o analyze the projected Army Force against fu DC SMDCOE will review the USASMDC Troo rt of a cyclic process as well when needed dur Path (MODPATH) reviews, Notification of Char reviews, etc.). Participate in BOIP Development ny-wide BOIPs under development, development DPATHs to USASMDC TOEs. Complete the S three-phased process consisting of a Needs izational based capability needs and gaps, de el solutions.	e of for in ture ps, ing ige nt. ent of Space velop			
U.S. Army Space and Missile Defense Command (USASMDC) Space and Miss execute these funds in FY 2021.	sile Defense Center of Excellence (SMDCoE)	will			
FY 2020 to FY 2021 Increase/Decrease Statement: PE 1206308 FE5 FY 2020 funding transfers to Project 990 in FY 2021					
<i>Title:</i> Position, Navigation, and Timing Navigation Warfare (PNT/NAVWAR)			-	-	3.110
Description: USASMDC Space and Missile Defense Center of Excellence (SM development efforts to enhance the resiliency and effectiveness of critical space JCIDS capability development activities for space superiority, theater missile we technology for the full range of Navigation Warfare, tactical space layer, hypers SMDCOE will provide support to PEO IEWS and PEO M&S to acquire and field capabilities. A JTAGS Block III CDD will be written to document the requirement hypersonics. A high altitude CDD will be written to capture the requirements for to provide resiliency for space based capabilities. CAPDEV support will be provide resiliency for space based capabilities.	ADCOE) will continue JCIDS capability e-based and space enabled assets and arning, high altitude, and emerging concepts/ sonics, counter hypersonics, and directed ener d space superiority and enhanced missile warr hts to meet advanced missile threats and to co r a high altitude, multi-mission, persistent platfor vided to the APNT CFT to document the endur	gy. hing unter orm ing			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date	: February 202	0
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603308A <i>I Army Space Systems</i> <i>Integration</i>	Project (Numbe 990 / Space And	e r/Name) I Missile Defen	se Integration
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
requirements for the tactical space layer and NAVWAR capabilities for adversaries.	or situational awareness, assured PNT and PNT denial t	o our		
U.S. Army Space and Missile Defense Command (USASMDC) Space execute these funds in FY 2021.	e and Missile Defense Center of Excellence (SMDCoE)	will		
FY 2021 Plans: Based on the results of our efforts in 2020 the USASMDC Space and identify and advocate for PNT and NAVWAR emerging requirements joint staff to establish and formalize joint NAVWAR requirements, in t Navigation and Timing (APNT) Cross Functional Team by conducting documents for APNT Enabling systems and APNT Situational Aware ? Write Alternate Navigation Concept of Operations ? Support planning and execution of Lonestar Development Operatio ? Support planning and execution of Alternate Navigation Development ? Write and coordinate Gunsmoke requirements document ? Write and coordinate Lonestar requirements document ? Document Alternate Navigation requirements ? Obtain input from the NAVWAR Community of Interest and write NA ? Support execution of NAVWAR Attack Study ? Facilitate inclusion of NAVWAR Attack systems in Army experiment about the Army need for this capability ? Write and coordinate NAVWAR Attack requirements document ? Identify how NAVWAR Attack concepts and capabilities will Multi-D ? Provide NAVWAR and space subject matter expertise to help deve ? Furnish NAVWAR subject matter expertise to support revision of Sp Division ? Conduct analysis to determine if the fielding of a candidate NAVWA FY 2020 to FY 2021 Increase/Decrease Statement: PE 1206308 FE5 FY 2020 funding transfers to Project 990 in FY 202 Title: APNT Integrated Space Communications	A Missile Defense Center of Excellence will continue to through Commander, U.S. Strategic Command to the he JCIDS process. Support the Army Assured Positionin grequired capability analysis and developing JCIDS ness. Specific actions planned are ans ent Operations AVWAR Attack CONOPS t, exercises, war games and other events to build knowl omain operations lop Fires Organizational and Operational Concept Docu pace Brigade Organizational and Operational Concept AR technology would drive organizational changes 1	ng edge ment		5.000
Description: Development of a unique advanced space communicat	ions capability to explore advanced ground based space	e		0.000
communications technologies and concepts utilizing bi-static Radio F	requency (RF) scattering and propagation with precision	ר		

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	0							
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603308A <i>I Army Space Systems</i> <i>Integration</i>	Projec 990 / 3	Project (Number/Name) 990 / Space And Missile Defense Integration									
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2019	FY 2020	FY 2021							
frequency, phase, and power management. This space communication advanced Army LEO space communications concepts and will also a communication missions.	ions capability will develop and demonstrate multiple assess interfacing with multiple Joint Service space											
The APNT CFT will execute \$5.0M of these funds in FY 2021												
FY 2021 Plans: Assess performance of space communications capabilities of multipl interfacing with multiple Joint Services.	le advanced Army LEO space communications concept	s and										
FY 2020 to FY 2021 Increase/Decrease Statement: Transfer from PE 1206308A FE5 to PE 0603308A Project 990 fundir	ng in FY 2021.											
	Accomplishments/Planned Programs Sul	ototals	-	-	26.230							
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>												
D. Acquisition Strategy												

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Integrat	ogram Ele 3308A I A tion	ement (N Army Spa	umber/N ce Syster	ame) ns	Project 990 / Sj	(Number bace And	r/ Name) Missile De	efense In	tegration
Management Service	es (\$ in M	lillions)		FY	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2	2021 CO	FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Personnel and Operations support	TBD	SMDC/ARSTRAT Huntsville, AL and Colorado Springs; SMDC/ARSTRAT Huntsville, AL and Colorado Spring : Huntsville, AL and Colorado Spring, CO	-	-		-		21.230		-		21.230	0.000	21.230	-
		Subtotal	-	-		-		21.230		-		21.230	0.000	21.230	N/A
Product Developme	nt (\$ in M	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2	2021 CO	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
APNT Integrated Space Communications0	TBD	Various : Huntsville AL, Wilmington, MA, Boulder CO, VA	-	-		-		5.000		-		5.000	0.000	5.000	-
Subtotal						-		5.000		-		5.000	0.000	5.000	N/A
			Prior Years	FY	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2 Of	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		0.000		26.230		-		26.230	0.000	26.230	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army												Da	te: F	Feb	oruary	y 2	020														
Appropriation/Budget Activity 2040 / 4								R- ′ PE Inte	1 Pro 060 egrai	ogra 330 tion	im E 8A /	leme Army	nt ⁄S	(Nu pac	ımb e S	er/N yste	lamo ms)	ļ	Proj 990	ect / S	t (N pac	um e A	ber/ nd N	'Na Miss	me) sile D	Defe	ense	Inte	egrat	ion
Event Name		F	Y 2	019		F	Y 20)20		F	Y 2	021	Τ		FY	202	2		F١	(20	23			FY	20	24		F	Y 2	025	
Eventivanie	1	2	2	3 4	1	2	2 3	3 4	4 1	1 :	2	3 4		1	2	3	4	1	2	3)	4	1	2	3	3 4		1	2	3	4
Space Superiority Capability Development									Þ																						
Counter ISR Capability Development									Þ																						
Space Operations Mulit-Domain Environment Analysis									Þ																						
ICEWS Study									Þ																						
High Altitude Impacts on Ground Effecitiveness Study									Þ.																						
NAVWAR Characterization Study									Þ																						
APNT CFT Analysis Support									Þ																						
Joint Space Warfighting Forum (JSWF) Analysis Support									Þ																						
Support of the APN/CFT									Þ																						
Low Earth Orbit									Þ																						
Development of SMDC MMN Force Tracking																															
Jericho Thunder Analysis Support																															
SMDC NanSat Analysis (SNAP, KE)																															

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	hibit R-4, RDT&E Schedule Profile: PB 2021 Army													Da	ate: F	ebrua	ary 2	2020						
Appropriation/Budget Activity 2040 / 4						R-1 PE Inte	Prog 0603 egratic	gram 308A on	Eleme A I Arm	ent y S	(Nui Space	mbe e Sy	er/Nam stems	ie)	Proj 990	ect (N / Spai	lum ce A	ber/l	Name lissile) De	fense	Inte	egrat	tion
		EV	2010		EV	2020		EV	2024				0022		EV 20	23		EV	2024			- V 2	025	
Event Name	1	2	3 4	1	2	3 4	1	2	3 4	4	1	2	3 4	1	2 3	4	1	2	3	4	1	2	3	4
Space Superiority Joint Architecture Analysis																								
Force Design Assessment of Army Forces							Þ																	
NAVWAR/PNT Gap Analysis and Advocacy							Þ																	
Space Simulation Support to TRADOC ARCIC Experimentation							Þ																	
NAVWAR Defense/Attack Operating Concepts and Requirement	t						E																	
Army Enduring JFFT Development																								
High Altitude Persistent Platform Capability Development Docur	nent	tation																						
APNT Integrated Space Communications																								

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Feb	ruary 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Numb PE 0603308A <i>I Army Space Sy</i> <i>Integration</i>	er/Name) /stems	Project (Number/Nar 990 / Space And Miss	ne) ile Defense Integratior
	Schedule Details			
	S	tart	E	nd
Events	Quarter	Year	Quarter	Year
Space Superiority Capability Development	1	2021	4	2023
Counter ISR Capability Development	1	2021	4	2023
Space Operations Mulit-Domain Environment Analysis	1	2021	4	2023
ICEWS Study	1	2021	1	2021
High Altitude Impacts on Ground Effecitiveness Study	1	2021	1	2021
NAVWAR Characterization Study	1	2021	1	2021
APNT CFT Analysis Support	1	2021	4	2024
Joint Space Warfighting Forum (JSWF) Analysis Support	1	2021	4	2024
Support of the APN/CFT	1	2021	4	2024
Low Earth Orbit	1	2021	4	2025
Development of SMDC MMN Force Tracking	1	2021	4	2023
Jericho Thunder Analysis Support	1	2021	4	2024
SMDC NanSat Analysis (SNAP, KE)	1	2021	4	2024
Space Superiority Joint Architecture Analysis	1	2021	4	2023
Force Design Assessment of Army Forces	1	2021	4	2022
NAVWAR/PNT Gap Analysis and Advocacy	1	2021	4	2024
Space Simulation Support to TRADOC ARCIC Experimentation	1	2021	4	2023
NAVWAR Defense/Attack Operating Concepts and Requirement	1	2021	4	2023
Army Enduring JFFT Development	1	2021	4	2023
High Altitude Persistent Platform Capability Development Documenta	tion 1	2021	4	2023
APNT Integrated Space Communications	1	2021	4	2022

Exhibit R-2, RDT&E Budget Item	n Justificat	i on: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P) Prior					am Element 27A / Air and	: (Number /l <i>Missile De</i>	Name) fense Syste	ems Engine	ering		
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	44.743	52.980	26.482	0.500	26.982	0.500	0.000	0.000	0.000	Continuing	Continuing
FG9: Air and Missile Defense (AMD) Electronic Warfare	-	44.743	52.980	26.482	0.500	26.982	0.500	0.000	0.000	0.000	Continuing	Continuing

Note

Beginning in FY 2020, the Army Long-Range Persistent Surveillance (ALPS) system efforts transition to Program Element 0604741A, Project 126.

A. Mission Description and Budget Item Justification

Funding in this program supports Cyber and Electromagnetic Activities (CEMA) efforts to conduct operational realistic assessments of Army Integrated Fires performance, identify system vulnerabilities, and develop mitigations against threats across the Cyber and Electromagnetic spectrum. Army radars and sensors, integrated air and missile defense mission command and fire control, Radio Frequency (RF) data and voice networks, and Positioning, Navigation, and Timing (PNT) technology will be assessed against current and postulated threat systems and techniques. Potential solutions developed by the Army, other Services, and Defense agencies (for example Missile Defense Agency) to close identified gaps will be demonstrated and assessed in live and simulated CEMA environments. Assessment events will be conducted approximately every two years. Implementation of potential solutions will occur between events using system-specific funding. The proposed solutions will then be assessed at the next event after implementation.

Included in this line are funds to plan and execute periodic CEMA activities with Army Integrated Fires systems, to include other Service and other Agency radar and sensor systems as appropriate. Upon completion of CEMA demonstration analyses, funding will facilitate initial recommendations for potential mitigations and solutions to Army sensors, C2, and RF data link vulnerabilities. Efforts in this program will also develop tools for use by Army radar and sensor systems to improve overall system performance in contested environments, to include effects-based CEMA Modeling and Simulation (M&S) to assess Army CEMA concepts in Hardware-In-The-Loop (HWIL) environment. Additionally, virtual models of critical hardware and software are being developed and implemented to allow for destructive testing with advanced CEMA threats in a lab environment. There will be continual interface with intelligence communities to maintain cognizance of emerging CEMA threats and incorporate these threats in future CEMA demonstrations. These activities follow a time-phased roadmap that identifies the investments needed to improve the resiliency of Army radar and sensors, C2, and RF data and voice networks in contested CEMA environments.

FY 2021 base funding of \$26.482 million will be used to plan and execute the FY 2021 Survivability Exercise to assess the performance of the Army Integrated Fires architecture, with Joint participants, in a live, tactically relevant, contested CEMA environment. Funds will be used to analyze the performance data of the FY 2021 Survivability Exercise participant weapon systems, identify vulnerabilities, and develop rapid mitigation concepts. Additionally, the funds will be used to execute Cyber Table Tops, continue the development of virtualized critical hardware and software, conduct destructive cyber vulnerability assessments, and integrate artificial intelligence and machine learning into weapon systems to mitigate current and future CEMA threats. FY 2021 OCO funding of \$.500 million will be used to complete operational assessment of ALPS prototype systems in support of a Combatant Commander.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Arm	ny			Dat	te: February 202	20
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4 Component Development & Prototypes (ACD&P)	: Advanced	R-1 Program PE 0603327 <i>F</i>	Element (Number/Name A I Air and Missile Defense	e) Systems Engineerin	g	
B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021	Total
Previous President's Budget	46.231	15.648	27.008	-		27.008
Current President's Budget	44.743	52.980	26.482	0.500		26.982
Total Adjustments	-1.488	37.332	-0.526	0.500		-0.026
 Congressional General Reductions 	-	-				
 Congressional Directed Reductions 	-	-7.668				
 Congressional Rescissions 	-	-				
 Congressional Adds 	-	45.000				
 Congressional Directed Transfers 	-	-				
 Reprogrammings 	-1.488	-				
 SBIR/STTR Transfer 	-	-				
 Adjustments to Budget Years 	-	-	-0.526	0.500		-0.026
Congressional Add Details (\$ in Millions, and Includ	les General Re	ductions <u>)</u>			FY 2019	FY 2020
Project: FG9: Air and Missile Defense (AMD) Electroni	ic Warfare					
Congressional Add: Interoperability of integrated air	r and missile dei	fense.			20.000	15.000
Congressional Add: Artificial Intelligence and Machi	ine Learning				-	25.000
Congressional Add: Cyber and Supply Chain Resili	ency				-	5.000
			Congressional Add Subt	otals for Project: FG9	20.000	45.000
			Congressional Add	Totals for all Projects	20.000	45.000

Exhibit R-2A, RDT&E Project Ju	stification	<mark>ո։</mark> PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 4 PE 0603327A / Air and Missile Defense FG9 / Air and Missile Defense Systems Engineering Electronic Warfare											1e) Defense (AN	ЛD)
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
FG9: Air and Missile Defense (AMD) Electronic Warfare	-	44.743	52.980	26.482	0.500	26.982	0.500	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Beginning in FY 2020, the Army Long-Range Persistent Surveillance (ALPS) system efforts transition to Program Element 0604741A, Project 126.

A. Mission Description and Budget Item Justification

Funding in this program supports Cyber and Electromagnetic Activities (CEMA) efforts to conduct operational realistic assessments of Army Integrated Fires performance, identify system vulnerabilities, and develop mitigations against threats across the Cyber and Electromagnetic spectrum. Army radars and sensors, integrated air and missile defense mission command and fire control, Radio Frequency (RF) data and voice networks, and Positioning, Navigation, and Timing (PNT) technology will be assessed against current and postulated threat systems and techniques. Potential solutions developed by the Army, other Services, and Defense agencies (for example Missile Defense Agency) to close identified gaps will be demonstrated and assessed in live and simulated CEMA environments. Assessment events will be conducted approximately every two years. Implementation of potential solutions will occur between events using system-specific funding. The proposed solutions will then be assessed at the next event after implementation.

Included in this line are funds to plan and execute periodic CEMA activities with Army Integrated Fires systems, to include other Service and other Agency radar and sensor systems as appropriate. Upon completion of CEMA demonstration analyses, funding will facilitate initial recommendations for potential mitigations and solutions to Army sensors, C2, and RF data link vulnerabilities. Efforts in this program will also develop tools for use by Army radar and sensor systems to improve overall system performance in contested environments, to include effects-based CEMA Modeling and Simulation (M&S) to assess Army CEMA concepts in Hardware-In-The-Loop (HWIL) environment. Additionally, virtual models of critical hardware and software are being developed and implemented to allow for destructive testing with advanced CEMA threats in a lab environment. There will be continual interface with intelligence communities to maintain cognizance of emerging CEMA threats and incorporate these threats in future CEMA demonstrations. These activities follow a time-phased roadmap that identifies the investments needed to improve the resiliency of Army radar and sensors, C2, and RF data and voice networks in contested CEMA environments.

FY 2021 base funding of \$26.482 million will be used to plan and execute the FY 2021 Survivability Exercise to assess the performance of the Army Integrated Fires architecture, with Joint participants, in a live, tactically relevant, contested CEMA environment. Funds will be used to analyze the performance data of the FY 2021 Survivability Exercise participant weapon systems, identify vulnerabilities, and develop rapid mitigation concepts. Additionally, the funds will be used to execute Cyber Table Tops, continue the development of virtualized critical hardware and software, conduct destructive cyber vulnerability assessments, and integrate artificial intelligence and machine learning into weapon systems to mitigate current and future CEMA threats. FY2021 OCO funding of \$.500 million will be used to complete operational assessment of ALPS prototype systems in support of a Combatant Commander.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army				Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/ PE 0603327A <i>I Air and Missile De</i> <i>Systems Engineering</i>	Name) efense	Project (N FG9 / Air a Electronic	u mber/Nan nd Missile I Warfare	1e) Defense (AN	MD)
hibit R-2A, RDT&E Project Justification: PB 2021 Army propriation/Budget Activity R-1 Program Element (Nine 2003) 40/4 PE 0603327A / Air and Mit Systems Engineering Accomplishments/Planned Programs (\$ in Millions) Systems Engineering Accomplishments/Planned Programs (\$ in Millions) Image: Systems Engineering India will be provided for continued system analysis to identify and recommend rapid mitigation conc		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Advanced Electronic Protection Enhancements		24.743	7.641	26.482	0.500	26.982
Description: Provides Cyber and Electromagnetic Activities (CEMA) planning, and post-mission analysis.	conducts CEMA demonstrations					
FY 2020 Plans: Funding will be provided for continued system analysis to identify and recommunifollowing the P-12 event; initial planning and preparation activities for P-13; conserves) with a virtualized AIAMD systems of systems architecture to measure a against advanced destructive cyber and electromagnetic threats; continue developments to identify, characterize, and mitigate performance impacts of CEMA Electromagnetic Activities (CEMA) roadmap and strategy to ensure coordination goals; and to continue virtualization of additional AIAMD sensors, launchers, C	end rapid mitigation concepts nduct a CEMA lab event (C system and mission performance elopment of algorithm based threats; update the Cyber and on and execution of prioritized 2, and supporting architecture.					
FY 2021 Base Plans: Funds will be used to plan and execute the FY 2021 Survivability Exercise to a the Army Integrated Fires architecture, with Joint participants, in a live, tactical environment. Funds will be used to analyze the performance data of the FY 20 participant weapon systems, identify vulnerabilities, and develop rapid mitigation funds will be used to execute Cyber Table Tops, continue the development of v software, conduct destructive cyber vulnerability assessments, and integrate an learning into weapon systems to mitigate current and future CEMA threats.	ssess the performance of y relevant, contested CEMA 21 Survivability Exercise on concepts. Additionally, the virtualized critical hardware and rtificial intelligence and machine					
<i>FY 2021 OCO Plans:</i> Funds will be used to continue an operational assessment of ALPS prototype s Commander identified need.	systems in support of a Combatant					
FY 2020 to FY 2021 Increase/Decrease Statement: The funding decreases from FY 2020 to FY 2021 due to completion of Artificial and Cyber and Supply Chain Resiliency efforts.	Intelligence/Machine Learning					
Title: FY 2020 SBIR/STTR Transfer		-	0.339	-	-	-
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2020 Plans:						

PE 0603327A: *Air and Missile Defense Systems Engineer...* Army

			Date: Febr	uary 2020	
R-1 Program Element (Number/ PE 0603327A I Air and Missile De Systems Engineering	Name) efense	Project (N FG9 I Air a Electronic	u mber/Nan nd Missile L Warfare	1e) Defense (AN	MD)
	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
s/Planned Programs Subtotals	24.743	7.980	26.482	0.500	26.982
	FY 2019	FY 2020			
	20.000	15.000			
e.					
	-	25.000			
	-	5.000			
Congressional Adds Subtotals	20.000	45.000			
	P-1 Program Element (Number/ E 0603327A I Air and Missile De Systems Engineering S/Planned Programs Subtotals e.	R-1 Program Element (Number/Name) E 0603327A I Air and Missile Defense Systems Engineering FY 2019 S/Planned Programs Subtotals 24.743 FY 2019 20.000 e. Congressional Adds Subtotals 20.000	Project (N FG9 / Air and Missile Defense Systems EngineeringProject (N FG9 / Air a ElectronicFY 2019FY 2020FY 2019FY 2020S/Planned Programs Subtotals24.74324.7437.980FY 2019FY 202020.00015.000e25.000-Congressional Adds Subtotals20.00020.00045.000	Date: FebrProject (Number/Name) E 0603327A / Air and Missile Defense systems EngineeringProject (Number/Nam FG9 / Air and Missile Defense Electronic WarfareFY 2019FY 2020FY 2021 BaseFY 2019FY 2020FY 2021 BaseJohn Programs Subtotals24.7437.980John Programs Subtotals20.00015.000Programs Subtotals20.00045.000Programs Subtotals20.00045.000	Date: February 2020 Program Element (Number/Name) Project (Number/Name) E 0603327A I Air and Missile Defense FG9 I Air and Missile Defense (AI Electronic Warfare FY 2019 FY 2020 FY 2021 FY 2021 FY 2019 FY 2020 FY 2021 Base OCO S/Planned Programs Subtotals 24.743 7.980 26.482 0.500 FY 2019 FY 2020 FY 2020 0 0 0 e. 20.000 15.000

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

N/A

<u>Remarks</u>

D. Acquisition Strategy

Assessment events will be conducted approximately every two years in live and simulated CEMA environments. In addition to Government planning and conduct of assessments, funding will also be provided through various contracts for subject matter expertise.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budg 2040 / 4	et Activity	1				R-1 Pro PE 060 System	ogram Ele 3327A I A s Enginee	ement (N Air and M Pering	lumber/Na issile Defe	ame) ense	Project FG9 / A Electror	(Number ir and Mis nic Warfar	r/ Name) ssile Defe re	nse (AML))
Management Servic	es (\$ in M	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	Various	Various : Various	2.831	1.688	Nov 2018	0.907	Nov 2019	0.926	Nov 2020	-		0.926	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.339		-		-		-	0.000	0.339	-
		Subtotal	2.831	1.688		1.246		0.926		-		0.926	Continuing	Continuing	N/A
Product Developme	nt (\$ in Mi	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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 Integration Assessment	Various	Various : Various	1.538	2.840	Nov 2018	2.673	Nov 2019	2.934	Nov 2020	-		2.934	Continuing	Continuing	Continuing
Interoperabiity of Integrated AMD	SS/CPFF	Various : Various	15.000	20.000	Feb 2019	14.957	Feb 2020	-		-		-	0.000	49.957	-
Cyber and Supply Chain Resiliency	Various	Various : Various	-	-		3.273	Mar 2020	-		-		-	0.000	3.273	-
Artificial Intelligence and Machine Learning	Various	Various : Various	-	-		14.667	Feb 2020	-		-		-	0.000	14.667	-
ALPS Development/ Integration	Various	Various : Various	28.831	7.495	Jan 2019	0.458	Jan 2020	0.000		0.500	Jan 2020	0.500	0.000	37.284	-
		Subtotal	45.369	30.335		36.028		2.934		0.500		3.434	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
Component Assessments & Research and Trade Studies	Various	Various : Various	12.512	5.850	Feb 2019	10.982	Feb 2020	12.801	Feb 2021	-		12.801	Continuing	Continuing	Continuing
		Subtotal	12.512	5.850		10.982		12.801		-		12.801	Continuing	Continuing	N/A

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Pro PE 060 System	ogram Ele 3327A / A s Enginee	ment (N ir and Mi ering	umber/Na issile Defe	a me) ense	Project FG9 / A Electror	(Number ir and Mis nic Warfar	r/ Name) ssile Defe e	nse (AME))
Test and Evaluation	(\$ in Milli	ons)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 O	2021 CO	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
Demonstration Planning and Execution	Various	Various : Various	4.200	6.870	Nov 2018	4.724	Nov 2019	9.821	Nov 2020	-		9.821	Continuing	Continuing	Continuing
		Subtotal	4.200	6.870		4.724		9.821		-		9.821	Continuing	Continuing	N/A
			Prior Years	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	64.912	44.743		52.980		26.482		0.500		26.982	Continuing	Continuing	N/A

Remarks

Partogram Element (Number(Name) Dodd) / 4 Prodec (Number(Name) Systems: Systems: System: Syst	Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy						Date: February	2020
Event Name FY 201 FY 202 FF 202 FY 202 FY 202 FF 202 <th>Appropriation/Budget Activity 2040 / 4</th> <th></th> <th></th> <th>R-1 P PE 06 Syster</th> <th>rogram Elemen 603327A I Air and ms Engineering</th> <th>t (Number/Name d Missile Defense</th> <th>) Project (FG9 / Air Electroni</th> <th>Number/Name) and Missile Defe c Warfare</th> <th>nse (AMD)</th>	Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 Syster	rogram Elemen 603327A I Air and ms Engineering	t (Number/Name d Missile Defense) Project (FG9 / Air Electroni	Number/Name) and Missile Defe c Warfare	nse (AMD)
Event Name In 2013 In 2014 In 2014 <th></th> <th>EV 2019</th> <th>EV 20</th> <th>020</th> <th>EV 2021</th> <th>EV 2022</th> <th>EV 2023</th> <th>EV 2024</th> <th>EV 2025</th>		EV 2019	EV 20	020	EV 2021	EV 2022	EV 2023	EV 2024	EV 2025
P-11 Analysis Efforts, Trade Studies, and Implementation P-12 Demonstration Planning Efforts P-12 Demonstration P-12 Demonstration P-12 Analysis Efforts, Trade Studies, and Implementation P-12 Survivability Exercise P121 Survivability Exercise P121 Survivability Exercise Analysis and Trade Studies P121 Survivability Exercise Report and Implementation Ar and Missile Defense (Congress Unterparability of Integrated Air and Missile Defense (Congr	Event Name	1 2 3 4	1 2	3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
P-12 Demonstration Planning Efforts P-12 Demonstration P-12 Analysis Efforts, Trade Studies, and Implementation P/21 Survivability Exercise Planning Efforts P/21 Survivability Exercise Analysis and Trade Studies P/21 Survivability Exercise Report and Implementation Interoperability of Integrated Air and Missile Defense (Congress	P-11 Analysis Efforts, Trade Studies, and Implementation								
P-12 Demonstration P-12 Analysis Efforts, Trade Studies, and Implementation PY21 Survivability Exercise Planning Efforts FY21 Survivability Exercise Analysis and Trade Studies FY21 Survivability Exercise Report and Implementation FY21 Survivability Exercise Report and Implementation Arr and Missile Defense (Congress	P-12 Demonstration Planning Efforts								
P-12 Analysis Efforts, Trade Studies, and Implementation FY21 Survivability Exercise Planning Efforts FY21 Survivability Exercise Analysis and Trade Studies FY21 Survivability Exercise Report and Implementation Air and Missile Defense Gronges Interoperability of Integrated Air and Missile Defense (Congress	P-12 Demonstration								
FY21 Survivability Exercise Planning Efforts FY21 Survivability Exercise Analysis and Trade Studies FY21 Survivability Exercise Report and Implementation Arr and Missile Defense Systems Hardware Virtualization Interoperability of Integrated Air and Missile Defense (Congress	P-12 Analysis Efforts, Trade Studies, and Implementation								
FY21 Survivability Exercise Analysis and Trade Studies FY21 Survivability Exercise Report and Implementation Air and Missile Defense Systems Hardware Virtualization Interoperability of Integrated Air and Missile Defense (Congress	FY21 Survivability Exercise Planning Efforts								
FY21 Survivability Exercise Report and Implementation Air and Missile Defense Systems Hardware Virtualization Interoperability of Integrated Air and Missile Defense (Congress	FY21 Survivability Exercise								
FY 21 Survivability Exercise Report and Implementation Air and Missile Defense Systems Hardware Virtualization Interoperability of Integrated Air and Missile Defense (Congress	FY21 Survivability Exercise Analysis and Trade Studies								
Air and Missile Defense Systems Hardware Virtualization Interoperability of Integrated Air and Missile Defense (Congress	FY 21 Survivability Exercise Report and Implementation								
Interoperabiility of Integrated Air and Missile Defense (Congress	Air and Missile Defense Systems Hardware Virtualization								
	Interoperabiilty of Integrated Air and Missile Defense (Congress								

hibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febr	uary 2020
propriation/Budget Activity 40 / 4	R-1 Program B PE 0603327A <i>Systems Engin</i>	Element (Numbe I Air and Missile E peering	r/Name) Defense	Project (Number/Nan FG9 <i>I Air and Missile I</i> <i>Electronic Warfare</i>	n e) Defense (AMD)
Sch	nedule Details	3			
	ſ	Sta	art	E	nd
Events		Quarter	Year	Quarter	Year
P-11 Demonstration		2	2018	3	2018
P-11 Analysis Efforts, Trade Studies, and Implementation		3	2018	1	2019
P-12 Demonstration Planning Efforts		4	2018	4	2019
P-12 Demonstration		4	2019	1	2020
P-12 Analysis Efforts, Trade Studies, and Implementation		1	2020	4	2020
FY21 Survivability Exercise Planning Efforts		4	2020	2	2021
FY21 Survivability Exercise		2	2021	3	2021
FY21 Survivability Exercise Analysis and Trade Studies		3	2021	1	2022
FY 21 Survivability Exercise Report and Implementation		2	2022	4	2022
Air and Missile Defense Systems Hardware Virtualization		2	2019	4	2022
Interoperabiilty of Integrated Air and Missile Defense (Congressional Adds	;)	4	2018	2	2021

Exhibit R-2, RDT&E Budget Item	n Justificat	i on: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACD	ation, Army 0&P)	/ BA 4: Adv	anced	R-1 Progra PE 060361	am Elemen 9A / Landrr	t (Number/ hine Warfare	Name) e and Barrie	r - Adv 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	-	40.255	82.915	64.092	-	64.092	44.621	60.843	44.437	16.423	Continuing	Continuing
606: Cntrmn/Barrier Adv Dev	-	2.869	0.000	0.000	-	0.000	0.000	4.947	4.578	9.935	0.000	22.329
BU5: Standoff Volcano Obstacle (SAVO) Adv Tech	-	0.000	12.983	6.956	-	6.956	0.000	0.000	0.000	0.000	0.000	19.939
EK7: Area Denial Capability Development	-	37.386	69.932	57.136	-	57.136	44.621	55.896	39.859	6.488	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) provides for the Concept Exploration and Refinement of Terrain Shaping Obstacles and develops modernized alternatives to the Family of Scatterable Mines systems.

Project 606 Countermine/Barrier Advanced Development enables development and evaluation of technologies that will perform detection, neutralization, and clearing of landmines and Improvised Explosive Devices (IEDs) at operational speeds. The Forward Reconnaissance and Explosive Hazard Detection (FREHD) system is a suite of four capabilities for use by route clearance patrols to provide standoff detection of explosive hazards: vehicle-mounted anomaly detection; pinpoint explosive hazard detection; explosive hazard vapor and particle detection; and remote visualization. FREHD increases the rate of advance of the route clearance formation while removing Soldiers and equipment from the proximity of blast and fragmentation.

Project BU5 Standoff Activated Volcano Obstacle (SAVO) provides an Anti-Vehicle (AV) capability to address the Army's directed close tactical obstacle capability gap and has been identified as a part of the Army Modernization Strategy. SAVO will utilize a Middle Tier of Acquisition approach for Rapid Prototyping and Fielding in accordance with Section 804 of the 2016 National Defense Authorization Act (NDAA). SAVO supports a United States Army Europe (USAREUR) Operational Needs Statement (ONS) ONS # 18-22702 as well as a revision to the Multiple Delivery Mine System (Volcano) Joint Service Operational Requirement (JSOR) # 0683. This capability will allow for a formation of pre-emplaced directed obstacles that can be initiated remotely via fielded wired or wireless initiation systems. If the emplaced obstacle is not initiated, SAVO can be recovered for future re-deployment. SAVO consists of a newly developed base plate from which the existing stock of National Landmine Policy compliant munitions (M87A1 Volcano canisters) can be launched. SAVO can be initiated via three fielded systems; the M7 Spider Networked Munition System, the MK152/M156 Remote Activation Munition Systems (RAMS), or the CD450-4J Blasting Machine. Fiscal Year (FY) 2021 funding resources the continued execution of the SAVO Rapid Prototyping activities in preparation for transition to the Rapid Fielding phase.

Project EK7 Area Denial Capability Development provides for the advanced capability development of terrain shaping obstacle systems and develops modernized alternatives to the Family of Scatterable Mines. The project will evaluate integrated technologies and develop prototype systems in a realistic operating environment for the next generation of Terrain Shaping Obstacles (TSO). TSO will deny the enemy terrain and freedom of action in a joint, multi-domain, high-intensity conflict while allowing friendly forces to maneuver freely within the same battle space. TSO may include multiple methods of defeat to include top attack and bottom attack and provide controlled scalable effects against mounted enemy forces that disrupt, turn, fix, delay or block their ability to maneuver. TSO enables the Combatant

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 A	my			ſ	Date: February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA Component Development & Prototypes (ACD&P)	4: Advanced	R-1 Program El PE 0603619A / L	ement (Number/Name) .andmine Warfare and E	Barrier - Adv Dev	
Commander to shape the battle space without exposing frier enabler for soldier lethality and creates targets for long range facilitate future development, maintenance, repair, and produ (ONS) # 18-22702.	ndly forces to ener e precision fires wi act improvements.	ny engagement. ithin the engagem TSO supports a	This capability supports ent area. TSO will utiliz United States Army Eur	Army Modernizat e an open system ope (USAREUR)	tion priorities as a critical n and modular architecture to Operational Needs Statement
B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OC	O FY 2021 Total
Previous President's Budget	45.198	92.915	6.963	-	- 6.963
Current President's Budget	40.255	82.915	64.092	-	- 64.092
Total Adjustments	-4.943	-10.000	57.129	-	- 57.129
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-10.000			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-4.943	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	57.129	-	- 57.129

Change Summary Explanation

FY 2021 funding increase in the amount of \$57.191 million due to realignment from Program Element (PE) 0604808A Landmine Warfare/Barrier - Eng Dev due to change in acquisition strategy.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	vrmy							Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 06036 ² <i>Barrier - A</i>	am Elemen 19A <i>I Landrr</i> dv Dev	t (Number / nine Warfar	' Name) e and	Project (N 606 / Cntrr	umber/Na mn/Barrier	me) Adv 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
606: Cntrmn/Barrier Adv Dev	-	2.869	0.000	0.000	-	0.000	0.000	4.947	4.578	9.935	5 0.000	22.329
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Project 606 Countermine/ Barrier landmines and Improvised Explose The Forward Reconnaissance and detection of explosive hazards: w remote visualization. FREHD inco fragmentation.	Advanced sive Device d Explosive vehicle-mou creases the	Developme s (IEDs) at o e Hazard De inted anoma rate of adva	nt enables operational etection (FR aly detection ance of the p	developmer speeds. REHD) syste n; pinpoint e route cleara	nt and evalu em is a suite explosive ha ance formati	uation of tec e of four cap azard detect ion while rer	hnologies th abilities for ion; explosi noving Solo	use by rou use by rou ve hazard diers and e	orm detection te clearance vapor and pro- quipment fro	on, neutrali e patrols to article dete om the pro>	zation, and o provide star oction; and kimity of blas	clearing of idoff t and
B. Accomplishments/Planned P	rograms (in Millions	<u>s)</u>						FY	2019	FY 2020	FY 2021
Title: Forward Reconnaissance a	nd Explosiv	/e Hazard D	etection (FI	REHD)						2.869	-	-
Description: The Forward Recor	naissance	and Explosi	ve Hazard	Detection (F	FREHD) sys	stem is a sui	ite of four c	apabilities f	or			

use by route clearance patrols to provide standoff detection of explosive hazards: vehicle-mounted anomaly detection; pinpoint explosive hazard detection; explosive hazard vapor and particle detection; and remote visualization. FREHD increases the rate of advance of the route clearance formation while removing Soldiers and equipment from the proximity of blast and fragmentation. FREHD enables development and evaluation of technologies that will perform detection, neutralization, and clearing of landmines and Improvised Explosive Devices (IEDs) at operational speeds.

Accomplishments/Planned Programs Subtotals

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

			FY 2021	FY 2021	FY 2021					Cost To	
Line Item	FY 2019	<u>FY 2020</u>	Base	000	Total	FY 2022	FY 2023	<u>FY 2024</u>	FY 2025	Complete	Total Cost
 415: Mine Neutral/Detection 	31.807	17.910	1.998	-	1.998	5.995	6.994	-	-	Continuing	Continuing
 R64001: HUSKY MOUNTED 	35.834	75.586	109.069	-	109.069	76.800	-	-	-	0.000	297.289
DETECTION SYSTEM (HMDS)											
• R64002: <i>HMDS - GROUND</i>	35.834	46.204	24.853	-	24.853	12.609	-	-	-	0.000	119.500
PENETRATING RADAR											
• R64003: <i>HMDS - DEEP</i>	-	29.382	84.216	-	84.216	64.191	-	-	-	0.000	177.789
BURIED DETECTION											

PE 0603619A: Landmine Warfare and Barrier - Adv Dev Army 2.869

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Exhibit R-2A, RDT&E Project Jus	tification: PB	2021 Army							Date: Feb	oruary 2020	
Appropriation/Budget Activity 2040 / 4				R-1 Pr PE 060 <i>Barrier</i>	r ogram Ele r 03619A <i>I La</i> r - Adv Dev	n ent (Numb ndmine Wan	er/Name) fare and	Project (I 606 / Cnti	Number/Na rmn/Barrier	i me) Adv Dev	
C. Other Program Funding Sumn	nary (\$ in Milli	ions)									
Line Item	<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> Complete	Total Cost

PE 0604808 Landmine Warfare/Barrier - Eng Dev Project 415 Mine Neutralization and Detection is the engineering development follow-on to this funding line, and is a shared project line. The above profile represents the total line and all combined efforts.

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.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	y				R-1 Pro PE 060 <i>Barrier</i>	o gram El o 3619A / L - Adv Dev	ement (N _andmine V	lumber/N Warfare	ame) and	Project 606 / C	: (Numbe ntrmn/Bai	r/Name) rrier Adv D)ev	
Management Service	es (\$ in M	lillions)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 ase	FY :	2021 CO	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 - HMDS	MIPR	PM Terrestrial Sensors : Fort Belvoir, VA	0.300	-		-		-		-		-	0.000	0.300	-
		Subtotal	0.300	-		-		-		-		-	0.000	0.300	N/A
Product Developme	nt (\$ in M	illions)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 ase	FY : O	2021 CO	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
HMDS To Be Determined	TBD	TBD : TBD	0.780	-		-		-		-		-	0.000	0.780	-
		Subtotal	0.780	-		-		-		-		-	0.000	0.780	N/A
Support (\$ in Million	s)			FY 2	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
HMDS Explosive Hazard Detection - Technology Analysis	MIPR	TRADOC : Ft. Eustis, VA	0.488	-		-		-		-		-	0.000	0.488	-
HMDS Explosive Hazard Detection - Engineering Support	MIPR	CERDEC NVESD : Ft. Belvoir, VA	1.115	-		-		-		-		-	0.000	1.115	-
HMDS Explosive Hazard Detection - System Analysis and Test Design	FFRDC	IDA : Alexandria, VA	0.230	-		-		-		-		-	0.000	0.230	-
FREHD	MIPR	Various : Various	-	2.869	Mar 2019	-		-		-		-	0.000	2.869	-
		Subtotal	1.833	2.869		-		-		-		-	0.000	4.702	N/A
PE 0603619A: <i>Landm</i> Army	ine Warfa	re and Barrier - Adv	v Dev		U	NCLASS Page 5 c	SIFIED of 28		R	-1 Line #	81				43

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	021 Army	y								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 <i>Barrier</i>	ogram Ele 3619A / L - Adv Dev	ement (N .andmine /	warfare	ame) and	Project 606 / <i>Cr</i>	(Numbe ntrmn/Bar	r/ Name) rrier Adv D	ev	
Test and Evaluation	(\$ in Milli	ions)	ſ	FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
HMDS Explosive Hazard Detection	MIPR	ATEC : Alexandria, VA	0.274	-		-		-		-		-	0.000	0.274	-
		Subtotal	0.274	-		-		-		-		-	0.000	0.274	N/A
			Prior Years	FY	2019	FY	2020	FY 2 Ba	2021 ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	3.187	2.869		0.000		-		-		-	0.000	6.056	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2	2021 Army					Date: Februar	y 2020
Appropriation/Budget Activity 2040 / 4		R Pl Ba	- 1 Program Elemer E 0603619A <i>I Landr</i> arrier - Adv Dev	nt (Number/Name mine Warfare and	e) Project 606 / Cn	(Number/Name) trmn/Barrier Adv	Dev
Event Name	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
HMDS/FREHD							

Exhibit R-4A, RDT de Schedule Details. FD 2021 Anny				Date: Febru	ary 2020
Appropriation/Budget Activity 2040 / 4	R-1 Prog PE 06036 <i>Barrier - A</i>	am Element (Number/N 19A <i>I Landmine Warfare</i> dv Dev	Name) e and	Project (Number/Nam 606 / Cntrmn/Barrier Ad	e) dv Dev
	Schedule De	tails			
		Star	t	En	d
Events		Quarter	Year	Quarter	Year
HMDS/FREHD		1	2018	4	2019

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army						Date: February 2020						
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0603619A <i>I Landmine Warfare and</i> <i>Barrier - Adv Dev</i>				Project (Number/Name) BU5 / Standoff Volcano Obstacle (SAVO) Adv Tech				
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
BU5: Standoff Volcano Obstacle (SAVO) Adv Tech	-	0.000	12.983	6.956	-	6.956	0.000	0.000	0.000	0.000	0.000	19.939
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project BU5 Standoff Activated Volcano Obstacle (SAVO) provides an Anti-Vehicle (AV) capability to address the Army's directed close tactical obstacle capability gap and has been identified as a part of the Army Modernization Strategy. SAVO will utilize a Middle Tier of Acquisition approach for Rapid Prototyping and Fielding in accordance with Section 804 of the 2016 National Defense Authorization Act (NDAA). SAVO supports a United States Army Europe (USAREUR) Operational Needs Statement (ONS) ONS # 18-22702 as well as a revision to the Multiple Delivery Mine System (Volcano) Joint Service Operational Requirement (JSOR) # 0683. This capability will allow for a formation of pre-emplaced directed obstacles that can be initiated remotely via fielded wired or wireless initiation systems. If the emplaced obstacle is not initiated, SAVO can be recovered for future re-deployment. SAVO consists of a newly developed base plate from which the existing stock of National Landmine Policy compliant munitions (M87A1 Volcano canisters) can be launched. SAVO can be initiated via three fielded systems; the M7 Spider Networked Munition System, the MK152/M156 Remote Activation Munition Systems (RAMS), or the CD450-4J Blasting Machine. Fiscal Year (FY) 2021 funding resources the continued execution of the SAVO Rapid Prototyping activities in preparation for transition to the Rapid Fielding phase.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: SAVO Rapid Prototyping	-	9.303	3.103
Description: SAVO system Rapid Prototyping phase.			
FY 2020 Plans: Performed SAVO system Rapid Prototyping phase to include; Initiation of new start effort, development of system design, conducted requirements review, development of test and evaluation hardware configurations and fabrication of prototype systems for test and evaluation.			
FY 2021 Plans: Continue to perform the SAVO system Rapid Prototyping phase to include: continuation of Rapid Prototyping efforts, completion of design review, qualification testing, and operational assessment.			
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funding decrease supports the budget being aligned to an independent cost estimate for the scope of work.			
Title: Engineering Support	-	0.202	2.614
Description: Provide Engineering Support.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020						
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A <i>I Landmine Warfare and</i> <i>Barrier - Adv Dev</i>	Project (Number/Name) BU5 I Standoff Volcano Obstacle (SAVO) Adv Tech				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 201	9 FY 2020	FY 2021		
FY 2020 Plans: Performed OGA and contract engineering support to the Integrated Pl	roduct Team supporting the Rapid Prototyping effort.					
FY 2021 Plans: Continue to perform OGA and contract engineering support to the Interprototyping effort.	egrated Product Team supporting the continued Rapid					
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funding increase supports plan testing and operational asses	ssment.					
Title: SAVO Management Services			- 1.285	0.318		
Description: Program Management and Support						
FY 2020 Plans: Performed program management of the SAVO program.						
<i>FY 2021 Plans:</i> Continue to perform program management of the SAVO program.						
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funding decrease aligns with anticipated level of effort.						
<i>Title:</i> SAVO Test & Evaluation			- 1.603	0.921		
Description: Provides support to Contractor/Government test activitie	es.					
FY 2020 Plans: Performed test and evaluation activities such as development of test a the prototype systems.	and evaluation strategy and conduction of initial testing	on				
FY 2021 Plans: Continue to perform test and evaluation activities and conduction of te	esting on the prototype systems.					
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funding decrease aligns with anticipated level of effort.						
Title: FY 2020 SBIR/STTR Transfer			- 0.590	-		
Description: Funding transferred in accordance with Title 15 USC ?6	38					
		I	I	I		
Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020		
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A <i>I Landmine Warfare and</i> <i>Barrier - Adv Dev</i>	Projec BU5 / S Adv Te	t (Number/I Standoff Vole ech	Name) cano Obstacle	e (SAVO)	
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2019	FY 2020	FY 2021	
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 Su	ototals	-	12.983	6.956	
C. Other Program Funding Summary (\$ in Millions)						

Remarks

D. Acquisition Strategy

SAVO will utilize a Middle Tier of Acquisition approach for Rapid Prototyping and Fielding acquisition approach in accordance with Section 804 of the 2016 NDAA. The Rapid Prototyping phase will utilize Other Transaction Authority. Prototypes will undergo a series of qualification and operational tests ahead of Initial Operational Capability scheduled for FY 2023.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020			
Appropriation/Budge 2040 / 4	t Activity	1			R-1 Program Element (Number/Name)Project (NPE 0603619A / Landmine Warfare andBU5 / StarBarrier - Adv DevAdv Tech								Number/Name) andoff Volcano Obstacle (SAVO) า				
Management Service	es (\$ in M	illions)		FY 2019		FY 2020		FY 2021 Base		FY 2	2021 CO	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		
SAVO Program Management TDY and Support	MIPR	PM Close Combat Systems : Picatinny Arsenal, NJ	-	-		1.315	Jan 2020	0.240	Dec 2020	-		0.240	0.000	1.555	-		
SAVO Contractor Support	C/FFP	BOWHEAD : Alexandria VA	-	-		-		0.078	Mar 2021	-		0.078	0.000	0.078	-		
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.590		-		-		-	0.000	0.590	-		
		Subtotal	-	-		1.905		0.318		-		0.318	0.000	2.223	N/A		
Product Developmen	nt (\$ in M	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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		
DOTC Manufacture Support	C/CPFF	TBD : TBD	-	-		6.332	Nov 2019	3.103	Oct 2020	-		3.103	0.000	9.435	-		
		Subtotal	-	-		6.332		3.103		-		3.103	0.000	9.435	N/A		
Support (\$ in Millions	s)			FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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 Army Research Laboratory Human Research & Engineering (HRED) MANPRINT Support	MIPR	CCDC Army Research Laboratory - HRED : Aberdeen, MD	-	-		0.050	Jan 2020	0.015	Dec 2020	-		0.015	0.000	0.065	-		
Contract Test and Engineering Support	C/CPFF	To Be Determined : To Be Determined	-	-		0.182	Jan 2020	-		-		-	0.000	0.182	-		
SAVO - CCDC Armaments Center Engineering Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	-	-		2.882	Jan 2020	2.599	Dec 2020	-		2.599	0.000	5.481	-		
Subtotal					3.114		2.614		-		2.614	0.000	5.728	N/A			

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603619A <i>I Landmine Warfare and</i> <i>Barrier - Adv Dev</i>						Project (Number/Name) BU5 / Standoff Volcano Obstacle (SAVO) Adv Tech					
Test and Evaluation (\$ in Millions)				FY 2019		FY 2	2020	FY 2021 Base		FY 2 O	2021 CO	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		
Other Government Agencies and Support Contractors	MIPR	Army Test & Evaluation Command (ATEC) : Aberdeen, MD	-	-		1.632	May 2020	0.921	Apr 2021	-		0.921	0.000	2.553	-		
		Subtotal	-	-		1.632		0.921		-		0.921	0.000	2.553	N/A		
Pr Ye				FY2	2019	FY 2021 FY 2 FY 2020 Base OC			2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract				
Project Cost Totals						12.983 6.956 -					6.956	0.000	19.939	N/A			

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021										Dat	e: Feb	oruary	2020			
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603619A / Landmine Warfare and Barrier - Adv DevProject (N BU5 / Star 									Number/Name) andoff Volcano Obstacle (SAVO)					
Event Name	FY 2019	FY	2020		FY 2	021	F	Y 2022		FY 2023		FY 2024		FY 2		025
Rapid Prototyping Decision Review	1 2 3 4	1 2	3 4	1	2	3 4	1 2	2 3	4 1	2 3 4	1	2 3	3 4	1	2	3 4
OTA Rapid Prototyping																
Focus Assesment																
User Jury			3													
Design Review					4											
Qualification Testing																
Operational Assesment						5										
SAVO Production Contract																
Rapid Fielding Decision Review							<u>6</u>	•								
Initial Operational Capability																

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Feb	ruary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0603619A <i>Barrier - Adv L</i>	Element (Numbe I Landmine Warf Dev	er/Name) are and	Project (Number/Name) BU5 / Standoff Volcano Obstacle (SAV Adv Tech			
	Schedule Detail	S					
		S	tart	E	ind		
Events		Quarter	Year	Quarter	Year		
Rapid Prototyping Decision Review		1	2020	1	2020		
OTA Rapid Prototyping		1	2020	4	2021		
Focus Assesment		3	2020	3	2020		
User Jury		4	2020	4	2020		
Design Review		2	2021	2	2021		
Qualification Testing		2	2021	4	2021		
Operational Assesment		4	2021	4	2021		
SAVO Production Contract		2	2022	2	2026		
Rapid Fielding Decision Review		2	2022	2	2022		
Initial Operational Capability		3	2023	3	2023		
Full Operational Capability		2	2026	2	2026		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 060361 <i>Barrier - A</i>	am Element 19A / Landm dv Dev	t (Number/ hine Warfare	Number/Name) a Denial Capability 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
EK7: Area Denial Capability Development	-	37.386	69.932	57.136	-	57.136	44.621	55.896	39.859	6.488	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project EK7 Area Denial Capability Development provides for the advanced capability development of terrain shaping obstacle systems and develops modernized alternatives to the Family of Scatterable Mines.

The project will evaluate integrated technologies and develop prototype systems in a realistic operating environment for the next generation of Terrain Shaping Obstacles (TSO). TSO will deny the enemy terrain and freedom of action in a joint, multi-domain, high-intensity conflict while allowing friendly forces to maneuver freely within the same battle space. TSO may include multiple methods of defeat to include top attack and bottom attack and provide controlled scalable effects against mounted enemy forces that disrupt, turn, fix, delay or block their ability to maneuver. TSO enables the Combatant Commander to shape the battle space without exposing friendly forces to enemy engagement. This capability supports Army Modernization priorities as a critical enabler for soldier lethality and creates targets for long range precision fires within the engagement area. TSO will utilize an open system and modular architecture to facilitate future development, maintenance, repair, and product improvements. TSO supports a United States Army Europe (USAREUR) Operational Needs Statement (ONS) # 18-22702.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Terrain Shaping Obstacles Capability Development	24.115	39.409	41.496
Description: Develop, build, and demonstrate Terrain Shaping Obstacle common munitions system. Demonstrate system in an operationally relevant environment.			
FY 2020 Plans: Conducted system level design, matured munitions technologies, matured obstacle delivery methods, integrated munitions into delivery system, matured system technology and reduced program technical and cost risk.			
FY 2021 Plans: Continue working towards the completion of common munition and dispenser launch module design, integrate munition with launcher, complete design verification and critical design review.			
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Fiscal Year (FY) 2021 funding decrease due to a change in acquisition strategy.			
Title: Engineering Support	9.154	4.446	7.310

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020)
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)Program Element (Number/Name)PE 0603619A / Landmine Warfare andElementBarrier - Adv DevElement	oject (Number/ 7 I Area Denial	Name) Capability De	velopment
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Description: Provide engineering support for Terrain Shaping Capability.				
FY 2020 Plans: Provided engineering support for system development, integration, contractor of modeling and simulation, and risk reduction efforts.	developmental testing, system performance			
FY 2021 Plans: Continue to provide engineering support for Terrain Shaping Obstacle common integration, design verification, and design qualification.	n munition design, dispenser launch module desig	n,		
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funding decrease due to a change in acquisition strategy.				
Title: Program Management and Oversight		4.117	3.678	0.930
Description: Program management and oversight of Terrain Shaping Obstacle	e Capability development and system evaluation.			
FY 2020 Plans: Provided program management and oversight for system development, integrate performance modeling and simulation, and risk reduction efforts. Conducted low program oversight.	ation, contractor developmental testing, system ong-range program planning, risk analysis, and			
FY 2021 Plans: Continue to provide program management and oversight for munition development integration, design verification, and design qualification.	nent, dispenser launcher module development,			
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funding decrease due to a change in acquisition strategy.				
Title: Test & Evaluation		-	1.688	6.400
Description: Conduct testing and evaluation of Terrain Shaping Obstacle Cap	ability performance.			
FY 2020 Plans: Supported contractor led sub-system integration testing and prototype testing a (PDR).	as needed. Conducted Preliminary Design Revie	v		
FY 2021 Plans:				

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army					Date: Fe	bruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Eler PE 0603619A / La Barrier - Adv Dev	nent (Number/l ndmine Warfare	Name) e and	Project EK7 <i>I Ar</i>	(Number/Na ea Denial Ca	a me) apability Dev	elopment
B. Accomplishments/Planned Programs (\$ in Millions)				F	Y 2019	FY 2020	FY 2021
Continue conducting government qualification testing to evaluate system capa reliability, and safety assessment. Conduct Critical Design Review (CDR).	abilities and limitation	ns for design qua	alification,				
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funding increase supports test hardware build and qualification testin	ng of top attack capal	bility.					
Title: TSO Future Capability Evaluation					-	17.535	1.000
Description: Develop, build, and demonstrate technologies for future Terrain	Shaping Obstacle (T	SO) capabilities	S.				
FY 2020 Plans: Completed technology maturation and prototype development, investigated sy Terrain Shaping Obstacles (TSO) capability insertions.	ystem and subsysten	n technology for	advanced				
FY 2021 Plans: Continue to complete technology maturation and prototype development, inve advanced Terrain Shaping Obstacles (TSO) capability insertions.	estigate system and s	subsystem techr	nology for				
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funding increase due to planned execution of multiple future capabilit	ity insertions.						
Title: FY 2020 SBIR/STTR Transfer					-	3.176	-
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							
	Accomplishment	s/Planned Prog	grams Sub	totals	37.386	69.932	57.136
C. Other Program Funding Summary (\$ in Millions) FY 2021 FY	Y 2021 FY 2021					Cost To	
Line Item FY 2019 FY 2020 Base	OCO Total	<u>FY 2022</u> F	Y 2023	<u>FY 2024</u>	<u>FY 2025</u>	Complete	Total Cost
• E76740: Close Terrain 4.995 Shaping Obstacle	- 4.995	30.369	47.953	37.963	10.989	0.000	132.269
<u>Remarks</u>							

		Date: February 2020
R-1 Program Element (Number/Name) PE 0603619A / Landmine Warfare and Parrier Adv Day	Project (N EK7 / Area	umber/Name) Denial Capability Development
	R-1 Program Element (Number/Name) PE 0603619A <i>I Landmine Warfare and</i> Barrier - Adv Dev	R-1 Program Element (Number/Name)Project (NPE 0603619A / Landmine Warfare andEK7 / AreaBarrier - Adv DevEK7 / Area

D. Acquisition Strategy

The Dominating Mobility through Terrain Shaping and Engagement (DMTTS&E) Initial Capabilities Document (ICD) was approved by the Joint Requirements Oversight Council (JROC) on 3 October 2014. The DMTTS&E ICD documents Terrain Shaping Obstacle (TSO) capabilities at all operational ranges including those within line-of-sight and those that are beyond line-of-sight. The Army completed an Analysis of Alternatives and intends to initially develop a hand-emplaced Top Attack capability to be fielded at close operational ranges. The Army previously awarded two initiatives which developed and demonstrated prototypes of the top attack system concept. The Army will award a single contract to complete development and qualification of the initial top attack capability. To achieve the full capability, the Army intends to develop an improved top attack capability followed by a modernized bottom attack capability. The top attack and bottom attack systems will then be integrated and networked through the full network capability development. The munitions developed during the top attack and bottom attack phases will serve as the basis for the future mid-range and deep-range employed TSO capabilities.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	/ 2020	
Appropriation/Budge 2040 / 4	Appropriation/Budget Activity 2040 / 4							ement (N andmine	Project (Number/Name) EK7 / Area Denial Capability Development						
Management Service	es (\$ in M	lillions)		FY	2019	FY 2020		FY 2021 Base		FY 2	2021 FY 202 CO Tota]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	PM-CCS : Picatinny Arsenal, NJ	1.535	1.893	Feb 2019	0.088	Jul 2020	0.337	Nov 2020	-		0.337	Continuing	Continuing	-
Scorpion Contract Closeout	MIPR	General Dynamics : TBD	-	0.305	Feb 2019	-		-		-		-	0.000	0.305	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		3.176		-		-		-	0.000	3.176	-
		Subtotal	1.535	2.198		3.264		0.337		-		0.337	Continuing	Continuing	N/A
Product Developmer	nt (\$ in M	illions)		FY	2019	FY	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
Top Attack Prototype Development A	SS/CPFF	Northrop Grumman Innovation Systems : Plymouth, MN	0.852	3.500	Mar 2019	-		-		-		-	0.000	4.352	-
Top Attack Prototype Development B	SS/CPFF	Textron Defense Systems : Wilmington, MA	0.949	13.360	Jul 2019	-		-		-		-	0.000	14.309	-
Technology Maturation Risk Reduction (TMRR) Development A	C/FFP	CCDC Armaments Research Center : Picatinny Arsenal, NJ	-	0.036	Feb 2019	-		-		-		-	0.000	0.036	-
Technology Maturation Risk Reduction (TMRR) Development B	C/FFP	CCDC Armaments Research Center : Picatinny Arsenal, NJ	-	0.036	Feb 2019	-		-		-		-	0.000	0.036	-
Common Component Communications Study	SS/CPFF	NAL Research Corporation : Manassas, Virginia	3.454	-		0.406	Feb 2020	-		-		-	0.000	3.860	-
Secure Communications Network	SS/CPFF	NGMS : Redondo Beach, CA	14.488	2.488		-		-		-		-	0.000	16.976	-
Common Secure Network Architecture	SS/CPFF	Textron Defense Systems : Wilmington, MA	14.488	3.477	Sep 2019	-		-		-		-	0.000	17.965	-

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	/ 2020		
Appropriation/Budge 2040 / 4	t Activity	/				R-1 Pro PE 060 <i>Barrier</i>	ogram Ele 3619A / L - Adv Dev	e ment (N .andmine /	umber/N Warfare	ame) and	Project (Number/Name) EK7 I Area Denial Capability Development					
Product Developmen	nt (\$ in M	illions)		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	
User Evaluation Prototypes	C/FFP	CCDC Armaments Research Center : Picatinny Arsenal, NJ	-	0.214	Jun 2019	-		-		-		-	0.000	0.214	-	
Top Attack Capability Development	C/CPFF	TBD : TBD	-	1.004		39.186		41.496	Dec 2020	-		41.496	0.000	81.686	-	
Future Capability Evaluation	SS/FFP	CCDC Armaments Research Center : Picatinny Arsenal, NJ	-	-		17.944	Jun 2020	1.000		-		1.000	0.000	18.944	-	
		Subtotal	34.231	24.115		57.536		42.496		-		42.496	0.000	158.378	N/A	
Support (\$ in Millions	5)			FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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 Engineering Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	5.578	6.808	Dec 2018	4.939	Jan 2020	5.160	Dec 2020	-		5.160	Continuing	Continuing	-	
CCDC C5ISR Center Engineering Support	MIPR	CCDC C5ISR Center : Fort Belvoir, VA	0.889	1.000	Jan 2019	0.073	Jan 2020	0.260	Jan 2021	-		0.260	Continuing	Continuing	-	
Mitre Engineering Support (C4)	FFRDC	Mitre : McLean, VA	-	0.634	Aug 2019	0.885	Aug 2020	1.145	Aug 2021	-		1.145	Continuing	Continuing	-	
Fibertek, INC. Operational Contractor Support	C/CPFF	FIBERTEK, INC. : Herndon, VA	0.130	-		-		-		-		-	0.000	0.130	-	
General Program Support	C/FFP	Millennium Corporation : Picatinny Arsenal, NJ	0.411	-		-		-		-		-	0.000	0.411	-	
General Program Support	C/FFP	Bowhead : Picatinny Arsenal, NJ	-	0.556	Jun 2019	0.349	May 2020	0.593	Jun 2021	-		0.593	0.000	1.498	-	
CCDC Army Research Laboratory Engineering Support	MIPR	CCDC Army Research Laboratory : Adelphi, MD	0.777	0.712	Jan 2019	0.578	Jan 2020	0.545	Jan 2021	-		0.545	Continuing	Continuing	-	

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 <i>Barrier</i>	ogram Ele 3619A / L - Adv Dev	ement (N andmine ′	umber/N Warfare	ame) and	Project EK7 / A	(Numbei rea Denia	r/ Name) al Capabil	ity Develo	opment
Support (\$ in Millions	s)			FY	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2	2021 CO	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
Milestone Document Development Support	SS/FFP	Booze Allen Hamilton : Picatinny Arsenal, NJ	2.484	1.173	Feb 2019	0.293		-		-		-	0.514	4.464	-
CCDC C5ISR Center NVESD Engineering Support	MIPR	CCDC C5ISR Center : Fort Belvoir, VA	-	-		0.373	Jan 2020	-		-		-	Continuing	Continuing	-
Air Worthiness Certification	MIPR	AMRDEC : Redstone Arsenal, AL	-	0.010	Dec 2018	-		-		-		-	0.000	0.010	-
Integrated Logistics Support	MIPR	TACOM ILSC : Warren, MI	-	0.156	Jan 2019	-		-		-		-	0.000	0.156	-
Polaris Contractor Support	C/FFP	MSCOE : Ft Leonard Wood - MO	-	0.024	Aug 2019	-		-		-		-	0.000	0.024	-
Milestone Document Development Support	C/FFP	TBD : TBD	-	-		-		0.200		-		0.200	0.000	0.200	-
		Subtotal	10.269	11.073		7.490		7.903		-		7.903	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ions)		FY	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2 OC	2021 CO	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 Development Demonstration	MIPR	USAF 96th Test Squadron / OGEX : Eglin AFB, FL	-	-		0.773		6.400		-		6.400	Continuing	Continuing	-
Target Vehicle Refurbishment	MIPR	Yuma Proving Ground : Yuma Proving Ground, AZ	-	-		0.346	Jan 2020	-		-		-	0.000	0.346	-
TSO High Performance Computing, Common Scene Generator, Target Modeling	MIPR	Aberdeen Proving Ground : Aberdeen, MD	-	-		0.523	Jan 2020	-		-		-	0.000	0.523	-
		Subtotal	-	-		1.642		6.400		-		6.400	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	2021 Arm	у							Date:	February	2020	
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 0603619 <i>Barrier - Ad</i>	m Element (N 9A I Landmine v Dev	lumber/N Warfare (ame) and	Project (EK7 / Are	Number ea Denia	r /Name) Il Capabili	ty Develo	pment		
	Prior Years	FY 2	019	FY 2020	FY	2021 ase	FY 2 OC	021 :O	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	46.035	37.386		69.932	57.136		-		57.136	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 202	21 Army									Da	te: F	ebruary	2020		
Appropriation/Budget Activity 2040 / 4			R-1 Pro PE 0603 <i>Barrier</i>	gram El 3619A / / - <i>Adv De</i>	emen Landn v	n t (Numt nine Wal	per/Name rfare and))	Project (EK7 <i>I Ar</i>	Num ea De	ber/N enial (Name) Capabili	ty Dev	elopm	nent
Event Name	FY 2019	FY 20	020	FY 20	21	FY	2022	F	Y 2023		FY	2024	F	Y 202	25
Interim Top Attack Capability Development	1 2 3 4		3 4 1	Z 3	4	1 2	3 4	1	2 3 4	1	Z	3 4	1	2 3	4
Materiel Solution Analysis	Materiel Solution Analy	sis													
Munitions Delivery System Analysis	Munitions Delivery Syste	am Analysis													
Development Decision	Developme	nt Decision													
Top Attack Capability Development Award	Top Attack C	apability Developn	nent Award												
Soldier Touch Point	3 Soldier T	ouch Point													
Top Attack System Development	T	op Attack System I	Developm ent												
Prototype Testing		Prototype Testir	ng												
SubSystem Integreation Testing		SubSyste	em Integrestion	n Testing											
Preliminary Design Review		Prelimina	iry Design Rev	riew											
Government Qualification Testing				Gove	nment Q	ualification T	esting								
Critical Design Review				Critical Des	ign Revie	***									
Top Attack Manufacturing Development				Top Attack	cinitial Pr	oduction Lin	e Setup								
L						1				1			1		



Exhibit R-4, RDT&E Schedule Profile: PB 2	2021 Army							Date:	February	2020
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 <i>Barrie</i>	Program Elemer 603619A / Landr er - Adv Dev	nt (Number/Name) mine Warfare and	ect (N Area	Number/Name) ea Denial Capability Development			
Event Name	FY 2019	FY 20	020	FY 2021	FY 2022	FY 202	23	F	r 2024	FY 2025
Event Name	1 2 3 4	1 2 3	3 4	1 2 3 4	1 2 3 4	1 2 3	4	1 2	3 4	1 2 3 4
Improved Top Attack Rapid Fielding Phase										Improved To
Bottom Attack Capability Development										
Bottom Attack Rapid Prototype Decision										Bottom Attack Rapid Pr
Bottom Attack Rapid Prototype Phase										Bottom Attac

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Feb	ruary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0603619A <i>Barrier - Adv L</i>	Element (Numbe I Landmine Warf Dev	er/Name) are and	Project (Number/Name) EK7 / Area Denial Capability Developn			
	Schedule Detail	S					
		Si	art	E	Ind		
Events		Quarter	Year	Quarter	Year		
Interim Top Attack Capability Development		2	2025	2	2025		
Materiel Development Decision		4	2015	4	2015		
Model and Simulation Development		1	2016	4	2018		
Concept Prototype Agreements Award(s)		2	2016	2	2016		
Concept Prototype Build		2	2016	4	2016		
Concept Prototype Test and Evaluation		1	2017	1	2017		
Analysis of Alternatives		1	2016	4	2016		
Materiel Solution Analysis		1	2017	3	2019		
Munitions Delivery System Analysis		4	2018	4	2019		
Development Decision		3	2019	3	2019		
Top Attack Capability Development Award		4	2019	4	2019		
Soldier Touch Point		4	2019	4	2019		
Top Attack System Development		4	2019	3	2022		
Prototype Testing		1	2020	2	2020		
SubSystem Integreation Testing		2	2020	2	2021		
Preliminary Design Review		3	2020	3	2020		
Government Qualification Testing		2	2021	2	2022		
Critical Design Review		2	2021	2	2021		
Top Attack Manufacturing Development		2	2021	1	2023		
Limited User Test		2	2022	2	2022		
Top Attack Fielding Decision		3	2022	3	2022		
Top Attack Production		3	2022	2	2025		

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		ruary 2020					
Appropriation/Budget Activity 2040 / 4	R-1 Program E PE 0603619A / Barrier - Adv De	l ement (Numbe Landmine Warfa ev	r/Name) are and	Project (Number/Name) EK7 <i>I Area Denial Capability Developme</i>			
		St	art	E	nd		
Events		Quarter	Year	Quarter	Year		
Top Attack Initial Operational Capability		4	2023	4	2023		
TSO Future Capability Evaluation		2	2020	2	2022		
TSO Development of Alternative Methods of Defeat		2	2020	2	2022		
Improved Top Attack Capability Development		2	2022	3	2029		
Improved Top Attack Rapid Prototype Decision		2	2022	2	2022		
Improved Top Attack Rapid Prototype Phase		3	2022	2	2025		
Soldier Touch Point 2		3	2023	3	2023		
Soldier Touch Point 3		3	2024	3	2024		
Improved Top Attack Qualification Testing		3	2024	3	2025		
Improved Top Attack Rapid Fielding Decision		3	2025	3	2025		
Improved Top Attack Rapid Fielding Phase		3	2025	3	2029		
Bottom Attack Capability Development		2	2025	2	2029		
Bottom Attack Rapid Prototype Decision		2	2025	2	2025		
Bottom Attack Rapid Prototype Phase		3	2025	3	2028		

Exhibit R-2, RDT&E Budget Item	Justificat	i on: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	st & Evalua types (ACD	ation, Army 0&P)	/ BA 4: Adv	anced	R-1 Program Element (Number/Name) PE 0603627A <i>I Smoke, Obscurant and Target Defeating Sys-Adv Dev</i>							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	19.852	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.852
E79: SMOKE/OBSCURANT SYSTEM	-	19.852	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.852

Note

The Screening Obscuration Module (SOM) program will transition from Engineering and Manufacturing Development (EMD) to the Production and Deployment phase in Fiscal Year 2020.

A. Mission Description and Budget Item Justification

SOM will increase platform survivability and soldier protection levels of maneuver forces by degrading enemy forces ability to detect United States targets. The use of battlefield obscuration is a time-tested military tactic to protect personnel, vehicles, equipment, and structures from detection; and to screen the locations, activities, and actions of friendly forces. Commanders who employ obscuration enjoy greater tactical success, freedom of maneuver, and force protection. The SOM assists the Brigade Combat Team (BCT) in retaining freedom of maneuver, conducting breaching operations, breaking contact with the enemy during security operations, and deceiving the enemy of the BCT's intentions. The SOM accomplishes this by degrading enemy forces ability to detect U.S. targets in the visual and near infrared region of the electromagnetic spectrum. The SOM will provide a man portable mountable and dismountable medium area visual screening obscuration capability that can be applied to manned combat platforms and unmanned robotic systems. The individual Soldier or team will employ the SOM devices on open and complex terrain as part of cross-domain obscuration effects synchronized with land and air maneuver during cross-domain windows of advantage.

Chemical Biological Radiological and Nuclear (CBRN) Integrated Early Warning (IEW) requirements detailed in PACOM ONS 17-22580 (HQDA validated in Jan 2018). The capability developed in support of ONS 17-22580 will provide enhancements and integrated CBRN defense sensors to provide early warning of CBRN attacks and events, supplemented with decision support software. Increasing the level of confidence of information to the Commander, facilitating their ability to make critical time sensitive decisions with high confidence and low regret to mitigate and manage the impacts of CBRN hazards.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Arm	ny			Date:	February 2020
Appropriation/Budget Activity		R-1 Program Ele	ement (Number/Name)		
2040: Research, Development, Test & Evaluation, Army I BA 4	: Advanced	PE 0603627A / S	Smoke, Obscurant and S	Target Defeating Sys-Ad	dv Dev
Component Development & Prototypes (ACD&P)					
B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	20.674	0.000	0.000	-	0.000
Current President's Budget	19.852	0.000	0.000	-	0.000
Total Adjustments	-0.822	0.000	0.000	-	0.000
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-0.822	-			
SBIR/STTR Transfer	-	-			

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020		
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060362 Target Defe	am Elemen 27A / Smoke eating Sys-/	t (Number/ e, Obscuran Adv Dev	Name) t and	Project (N E79 / SMO	roject (Number/Name) 79 / SMOKE/OBSCURANT 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	
E79: SMOKE/OBSCURANT SYSTEM	-	19.852	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.852	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

The Screening Obscuration Module (SOM) will increase platform survivability and soldier protection levels of maneuver forces by degrading enemy forces' ability to detect United States targets. The use of battlefield obscuration is a time-tested military tactic to protect personnel, vehicles, equipment, and structures from detection and to screen the locations, activities, and actions of friendly forces. Commanders who employ obscuration achieve greater tactical success, freedom of maneuver, and force protection. The SOM assists the Brigade Combat Team (BCT) in retaining freedom of maneuver, conducting breaching operations, breaking contact with the enemy during security operations, and deceiving the enemy of the BCT's intentions. The SOM accomplishes this by degrading enemy forces' ability to detect U.S. targets in the visual and near infrared region of the electromagnetic spectrum. The SOM will provide a man-portable mountable and dismountable medium area visual screening obscuration capability that can be applied to manned combat platforms and unmanned robotic systems. The individual Soldier or team will employ the SOM devices on open and complex terrain as part of cross-domain obscuration effects synchronized with land and air maneuver during cross-domain windows of advantage.

Chemical Biological Radiological and Nuclear (CBRN) Integrated Early Warning (IEW) requirements detailed in PACOM ONS 17-22580 (HQDA validated in Jan 2018). The capability developed in support of ONS 17-22580 will provide enhancements and integrated CBRN defense sensors to provide early warning of CBRN attacks and events, supplemented with decision support software. As a result, the capability will increase the level of confidence of information to the Commander, facilitating his/her ability to make critical, time sensitive decisions with high confidence and low regret to mitigate and manage the impacts of CBRN hazards.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: SOM: Product Development	5.078	-	-
Description: Provide Screening Obscuration Module (SOM) Development: Government and Contractor team will continue design and development of hardware in preparation for Government Development and User testing.			
Title: SOM: Test, Evaluation & Other Government Agencies (OGA's)	1.749	-	-
Description: Provide Test and Evaluation of SOM systems (Developmental and User testing to ensure effectiveness, suitability, survivability, and safety as a mounted and dismounted system).			
Title: SOM: Project Management	0.516	-	-
Description: Provide Project Management efforts.			
Title: CBRN IEW	12.235	-	-

PE 0603627A: Smoke, Obscurant and Target Defeating Sy... Army

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020)
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603627A <i>I Smoke, Obscurant and</i> <i>Target Defeating Sys-Adv Dev</i>	Project (I E79 / SM	Number/N OKE/OBS	lame) SCURANT SY	'STEM
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2019	FY 2020	FY 2021
Description: CBRN Theater Chemical and Biological Defense efforts.					
Title: SOM Support Costs			0.274	-	-
	Accomplishments/Planned Programs Subt	otals	19.852	-	-
C. Other Preason Eunding Summary (¢ in Millions)					

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

N/A

Remarks

SSN MX0600

D. Acquisition Strategy

Acquisition Strategy:

Screening Obscuration Module (SOM): The SOM acquisition strategy is a single-step System Integration and Development (SID) phase leading to a Milestone C production decision. A Full and Open Cost Plus Incentive Fee competitive contract was awarded and will be used to develop the SOM during the SID phase. Fixed Price Incentive (Successive Targets) options for production were included in the contract. The acquisition strategy includes system development and demonstration, full system integration, design for producibility and demonstration of interoperability, safety, military utility and reliability.

CBRN IEW: The \$12.2 million in FY 2019, will address this rapid capability development, cyber security, qualification and performance test and evaluation (T&E) efforts. This funding will yield a Capability and Limitation Report in 1Q FY 2020 to support the deployment of the Full Operational Capability (FOC) in 2Q FY 2020

Exhibit R-3, RDT&E F	Project Co	ost Analysis: PB 2	021 Army	y								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	,				R-1 Pro PE 060 <i>Target</i>	ogram Ele 3627A / S Defeating	ement (N Smoke, O Sys-Adv	umber/N bscurant Dev	ame) and	Project E79 / Si	(Number MOKE/OB	r/ Name) BSCURAI	NT SYST	EM
Management Service	s (\$ in M	illions)	ſ	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 O(2021 CO	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
SOM-Project Management Personnel	MIPR	JPM NBC CA : Edgewood, MD	8.796	0.532	Nov 2018	-		-		-		-	Continuing	Continuing	Continuing
JUONS CC-0557 Project Management Personnel	Various	JPM Guardian : Edgewood, MD	0.674	-		-		-		-		-	0.000	0.674	-
CBRN IEW	TBD	JPEO-CBRND : APG	-	1.000	Feb 2019	-		-		-		-	0.000	1.000	-
		Subtotal	9.470	1.532		-		-		-		-	Continuing	Continuing	N/A
												-			I
												-			
Product Developmen	t (\$ in Mi	llions)		FY 2	2019	FY	2020	FY 2 Ba	2021 ISE	FY 2 OC	2021 CO	FY 2021 Total			Target
Product Developmen	t (\$ in Mi Contract Method & Type	llions) Performing Activity & Location	Prior Years	FY 2 Cost	2019 Award Date	FY 2 Cost	2020 Award Date	FY 2 Ba Cost	2021 se Award Date	FY 2 OC Cost	2021 CO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item SOM Product Development	t (\$ in Mi Contract Method & Type C/CPIF	Performing Activity & Location L3 : Melbourne, FL	Prior Years 32.579	FY 2 Cost 5.078	2019 Award Date Feb 2019	FY 2 Cost	2020 Award Date	FY 2 Ba Cost	2021 se Award Date	FY 2 OC Cost	2021 CO Award Date	FY 2021 Total Cost	Cost To Complete Continuing	Total Cost Continuing	Target Value of Contract Continuing
Product Development Cost Category Item SOM Product Development CBRN IEW	t (\$ in Mi Contract Method & Type C/CPIF C/Various	Ilions) Performing Activity & Location L3 : Melbourne, FL Vectrus : Reston, VA	Prior Years 32.579	FY 2 Cost 5.078 6.750	2019 Award Date Feb 2019 Mar 2019	FY 2 Cost -	2020 Award Date	FY 2 Ba Cost -	2021 Ise Award Date	FY 2 00 Cost -	2021 CO Award Date	FY 2021 Total Cost	Cost To Complete Continuing 0.000	Total Cost Continuing 6.750	Target Value of Contract Continuing
Product Development Cost Category Item SOM Product Development CBRN IEW JUONS CC-0557 - Product Development	t (\$ in Mi Contract Method & Type C/CPIF C/Various Option/ T&M	Ilions) Performing Activity & Location L3 : Melbourne, FL Vectrus : Reston, VA AMRDEC : Huntsville, AL	Prior Years 32.579 - 1.396	FY 2 Cost 5.078 6.750 -	2019 Award Date Feb 2019 Mar 2019	FY 2 Cost - - -	2020 Award Date	FY 2 Ba Cost - - -	2021 Ise Award Date	FY 2 00 Cost - - -	2021 CO Award Date	FY 2021 Total Cost - -	Cost To Complete Continuing 0.000 0.000	Total Cost Continuing 6.750 1.396	Target Value of Contract Continuing - -
Product Development Cost Category Item SOM Product Development CBRN IEW JUONS CC-0557 - Product Development CBRN IEW	t (\$ in Mi Contract Method & Type C/CPIF C/Various Option/ T&M MIPR	Ilions) Performing Activity & Location L3 : Melbourne, FL Vectrus : Reston, VA AMRDEC : Huntsville, AL ECBC : APG	Prior Years 32.579 - 1.396 -	FY 2 Cost 5.078 6.750 - 2.212	2019 Award Date Feb 2019 Mar 2019 Feb 2019	FY 2 Cost - - - -	2020 Award Date	FY 2 Ba Cost - - -	2021 Ise Award Date	FY 2 00 Cost - - -	2021 CO Award Date	FY 2021 Total Cost - - -	Cost To Complete Continuing 0.000 0.000 0.000	Total Cost Continuing 6.750 1.396 2.212	Target Value of Contract Continuing - -
Product Development Cost Category Item SOM Product Development CBRN IEW JUONS CC-0557 - Product Development CBRN IEW	t (\$ in Mi Contract Method & Type C/CPIF C/Various Option/ T&M MIPR	llions) Performing Activity & Location L3 : Melbourne, FL Vectrus : Reston, VA AMRDEC : Huntsville, AL ECBC : APG Subtotal	Prior Years 32.579 - 1.396 - 33.975	FY 2 Cost 5.078 6.750 - 2.212 14.040	2019 Award Date Feb 2019 Mar 2019 Feb 2019	FY 2 Cost - - - - -	2020 Award Date	FY 2 Ba Cost - - - - - -	2021 Ise Award Date	FY 2 00 Cost - - - - -	2021 CO Award Date	FY 2021 Total Cost - - - -	Cost To Complete Continuing 0.000 0.000 0.000 Continuing	Total Cost Continuing 6.750 1.396 2.212 Continuing	Target Value of Contract Continuing - - - N/A
Product Development Cost Category Item SOM Product Development CBRN IEW JUONS CC-0557 - Product Development CBRN IEW CBRN IEW Support (\$ in Millions	t (\$ in Mi Contract Method & Type C/CPIF C/Various Option/ T&M MIPR	llions) Performing Activity & Location L3 : Melbourne, FL Vectrus : Reston, VA AMRDEC : Huntsville, AL ECBC : APG Subtotal	Prior Years 32.579 - 1.396 - 33.975	FY 2 Cost 5.078 6.750 - 2.212 14.040 FY 2	2019 Award Date Feb 2019 Mar 2019 Feb 2019	FY 2 Cost - - - - - - - - -	2020 Award Date 2020	FY 2 Ba Cost - - - - - - - - - - - - - - - - - - -	2021 Ise Award Date 2021 Ise	FY 2 00 Cost - - - - - - - - - - - - - - - - - - -	2021 CO Award Date 2021 CO	FY 2021 Total Cost - - - - - FY 2021 Total	Cost To Complete Continuing 0.000 0.000 0.000 Continuing	Total Cost Continuing 6.750 1.396 2.212 Continuing	Target Value of Contract Continuing - - - N/A
Product Development SOM Product Development CBRN IEW JUONS CC-0557 - Product Development CBRN IEW Support (\$ in Millions Cost Category Item	t (\$ in Mi Contract Method & Type C/CPIF C/Various Option/ T&M MIPR	llions) Performing Activity & Location L3 : Melbourne, FL Vectrus : Reston, VA AMRDEC : Huntsville, AL ECBC : APG Subtotal Performing Activity & Location	Prior Years 32.579 - 1.396 - 33.975 Prior Years	FY 2 Cost 5.078 6.750 - 2.212 14.040 FY 2 Cost	2019 Award Date Feb 2019 Mar 2019 Feb 2019 2019 2019 Award Date	FY 2 Cost - - - - - - - - - - - - - - - - - - -	2020 Award Date 2020 Award Date	FY 2 Ba Cost - - - - - FY 2 Ba Cost	2021 Ise Award Date 2021 Ise Award Date	FY 2 00 Cost - - - - - - - - - - - - - - - - - - -	2021 CO Award Date 2021 CO Award Date	FY 2021 Total Cost - - - - - FY 2021 Total Cost	Cost To Complete Continuing 0.000 0.000 Continuing	Total Continuing 6.750 1.396 2.212 Continuing	Target Value of Contract Continuing - - - N/A Target Value of Contract
Product Development SOM Product Development CBRN IEW JUONS CC-0557 - Product Development CBRN IEW Support (\$ in Millions Cost Category Item SOM Support Costs	t (\$ in Mi Contract Method & Type C/CPIF C/Various Option/ T&M MIPR	Ilions) Performing Activity & Location L3 : Melbourne, FL Vectrus : Reston, VA AMRDEC : Huntsville, AL ECBC : APG Subtotal Performing Activity & Location CCDC-CBD : APG, MD	Prior Years 32.579 - 1.396 - 33.975 Prior Years -	FY 2 Cost 5.078 6.750 - 2.212 14.040 FY 2 Cost 0.319	2019 Award Date Feb 2019 Mar 2019 Feb 2019 Coll9 Award Date	FY 2 Cost - - - - - - - - - - - - - - - - - - -	2020 Award Date 2020 Award Date	FY 2 Ba Cost - - - - - FY 2 Ba Cost -	2021 Ise Award Date 2021 Se Award Date	FY 2 00 Cost - - - - - - - - - - - - - - - - - - -	2021 CO Award Date 2021 CO Award Date	FY 2021 Total Cost - - - - - - - - - - - - - - - - - - -	Cost To Complete Continuing 0.000 0.000 Continuing Cost To Complete 0.000	Total Continuing 6.750 1.396 2.212 Continuing Total Cost 0.319	Target Value of Contract Continuing - - - N/A Target Value of Contract -

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4		R-1 Program Element (Number/Name) PE 0603627A / Smoke, Obscurant and Target Defeating Sys-Adv DevProject (N E79 / SMO						(Number MOKE/OB	r/ Name) BSCURAI	NT SYSTI	ΞM				
Test and Evaluation	(\$ in Milli	ons)	Γ	FY	2019	FY 2	020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
SOM Test, Evaluation & OGA's	MIPR	Various OGA : Various	3.759	1.749	Nov 2018	-		-		-		-	Continuing	Continuing	Continuing
CBRN IEW	MIPR	Various OGAs : Various	-	2.212	Jan 2019	-		-		-		-	0.000	2.212	-
		Subtotal	3.759	3.961		-		-		-		-	Continuing	Continuing	N/A
		ſ	Prior Years	FY 2	2019	FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	47.204	19.852		0.000		-		-		-	Continuing	Continuing	N/A
Remarks															

FY19 budget control is incorrect. JPEO-CBRND received a total of \$19.851M in PE 603627A. \$12.174M for ATP IEW Requirement. \$7.677M for the base program SOM

chibit R-4, RDT&E Schedule Profile: PB 2021 Army Date: February 2020														
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603627A / Smoke, Obscurant and Target Defeating Sys-Adv Dev							Project (Number/Name) E79 / SMOKE/OBSCURANT SYSTEM					
Event Name	FY 2019	FY 20	20	FY 20	21	F	Y 2022		FY 2023	4	FY	2024	F)	(2025
SOM Design and Fabrication		1 2 3							2 3		1 2	<u> </u>	1	
SOM Developmental Testing #2														
SOM User Testing														
SOM MS C			4											
SOM Production Award			4											
SOM Production														
SOM FAT														
JUONS CC-0557 Development/Demonstration														
CBRN IEW														
						1		<u> </u>		I			1]

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febr	uary 2020		
ppropriation/Budget Activity 040 / 4	R-1 Program PE 0603627A <i>Target Defeati</i>	Element (Number I Smoke, Obscura ng Sys-Adv Dev	r/Name) ant and	Project (Number/Name) E79 / SMOKE/OBSCURANT SYSTEM			
	Schedule Detail	S					
		Sta	art	Er	nd		
Events		Quarter	Year	Quarter	Year		
SOM Design and Fabrication		4	2016	2	2019		
SOM Developmental Testing #1		2	2018	4	2018		
SOM Developmental Testing #2		2	2019	2	2020		
SOM User Testing		1	2020	1	2020		
SOM MS C		3	2020	3	2020		
SOM Production Award		3	2020	3	2020		
SOM Production		1	2021	4	2021		
SOM FAT		1	2021	1	2021		
JUONS CC-0557 Development/Demonstration		2	2017	2	2019		
CBRN IEW		1	2019	4	2019		

Exhibit R-2, RDT&E Budget Iten	n Justifica	tion: PB 202	21 Army							Date: Febr	uary 2020							
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	ppropriation/Budget Activity 040: Research, Development, Test & Evaluation, Army I BA 4: Advanced omponent Development & Prototypes (ACD&P)							R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber 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						
Total Program Element	-	40.358	77.696	92.753	-	92.753	39.193	32.769	26.811	14.003	Continuing	Continuing						
694: Medium Caliber Ammunition	-	1.435	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.435						
BQ4: 155mm Artillery Propulsion XM654	-	0.000	7.200	15.705	-	15.705	0.000	0.000	0.000	0.000	0.000	22.905						
EB8: OWL for Small Caliber Ammunition	-	1.984	2.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.984						
EB9: Aviation Airborne Expendable Countermeasures	-	5.004	3.186	4.496	-	4.496	6.054	0.000	0.000	0.000	0.000	18.740						
EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	5.334	6.821	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.155						
EC3: Ammunition Logistics Prototyping	-	1.271	1.525	1.713	-	1.713	2.168	1.798	1.834	1.870	0.000	12.179						
EL7: Reduced Range Ammunition	-	2.090	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.090						
EU3: .50 Caliber All-Purpose Tactical Cartridge (APTC)	-	0.000	4.250	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.250						
FA5: Assured Precision Weapons and Munitions	-	13.797	31.267	29.878	-	29.878	30.971	30.971	24.977	12.133	Continuing	Continuing						
FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	5.713	21.447	40.961	-	40.961	0.000	0.000	0.000	0.000	Continuing	Continuing						
XT5: 30mm Anti-Personnel and Counter UAS	-	3.730	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.730						

Note

In Fiscal Year (FY) 2021 there are no budget requests for:

- Project EB8 One-Way Luminescence (OWL) for Small Caliber funding transitioned to Budget Activity (BA) 5 Program Element (PE) 0604802A Weapons and Munitions - Eng Dev Weapons

and Munitions - Eng Dev Project EP4 OWL Small Caliber Ammo.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber Ammunition</i>	

- Project EC2 Adv Armor-Piercing (ADVAP) Small Cal Ammo funding transitioned to BA 5 PE 0604802A Weapons and Munitions - Eng Dev Project EP5 Adv Armor Piercing (ADVAP)

Small Caliber Ammo and Project FL4 Small Caliber Ammo Next Gen Squad Weapons.

- Project EU3 A.50 Caliber All-Purpose Tactical Cartridge (APTC) funding transitioned to BA 5 PE Budget Activity 05, PE 0604802A, Project EU5 .50 Caliber All-Purpose Tactical Cartridge (APTC).

A. Mission Description and Budget Item Justification

The Tank and Medium Caliber Ammunition Program Element encompasses a comprehensive program to develop, rapidly transition to production, and field advanced weapons and munitions for small, medium and large caliber munitions, tank ammunition, mortar ammunition, cannon artillery ammunition, and close combat system items. These Projects will ensure continued battlefield overmatch and lethality of United States maneuver forces against the full range of modern battlefield threats. To achieve this, Tank and Medium Caliber Ammunition projects will identify and develop promising technologies through competitive development and streamlined acquisition procedures.

Project 694 Medium Caliber Ammunition: This Project supports development of 30x113 millimeter (mm) self-destructing airburst munitions and qualify 30x113mm linked ammunition for ground vehicles. Increase precision and lethality capability to defeat personnel and materiel targets as well as support the Joint Urgent Operational Need Statement (JUONS) CC-0558 Counter-Unmanned Aerial Systems (C-UAS) to counter the rapidly evolving threat of Unmanned Aerial Systems. This effort will qualify the links for use with existing M788 and M789 ammunition and develop self-destructing and airburst capable munitions fired from the Lightweight 30x113mm Link Fed Chain Gun. There is no Fiscal Year (FY) 2021 request.

Project BQ4 155mm Artillery Propulsion: Supercharge is a stand-alone top-zone 155 millimeter (mm) propelling charge required to achieve maximum range requirements from the XM1299A1 Extended Range Cannon Artillery (ERCA) Self-Propelled Howitzer (SPH). It will achieve lethality overmatch out to 70 kilometers (km) with developmental extended range projectiles, and will increase range with legacy projectiles by thirty percent. Supercharge is composed of combustible cartridge case (foamed celluloid or felted fiber technology), integral metal Stub Case, electrically initiated primer, and advanced artillery propellant. FY 2021 funding will support design risk reduction and prototype maturation efforts for two parallel Supercharge variants (2-piece bag and cased) to support the concurrent development of ERCA Increment 1C and ERCA Increment 2 (with added automated loading system), which directly supports the Army's Long Range Precision Fires (LRPF) Cross Functional Team (CFT) priority in support of the National Defense Strategy.

Project EB8 OWL for Small Caliber: The 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 project's objective is to develop and field a full tracer round to 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 followed by a similar development strategy for .50 caliber cartridges. There is no FY 2021 funding request.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber Ammunition</i>	
Project EB9 Aviation Airborne Expendable Countermeasure (AAECM) suppor include the XM215 Flare and XM20 Radio Frequency (RF) expendables. The for Army aircraft. Army Research Development Technology & Evaluation (RD AAECM capability, a critical enabler for the Future Vertical Lift (FVL) - Aircraft	rts the advanced development activities and technology d se expendable countermeasures systems are essential p T&E) efforts are coordinated with Program Executive Offi t Survivability Equipment (ASE) CFT within the Army's top	emonstrations of the AAECM to arts of survivability equipment ce (PEO) Aviation to address the modernization priorities.
These advanced decoys will address deficiencies in Army aircraft protection a (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. T in realistic operating test environments. Prototypes will demonstrate compone includes initial developmental/operational testing on XM215 and RF Countern	and the safety of its aircrews against advanced Man-Porta This program will evaluate integrated technologies and co ent and subsystem maturity prior to integration into major neasures (CM).	able Air Defense Systems ountermeasure prototype systems Army aircraft platforms. FY 2021
Project EC2 ADVAP: The Advanced Armor-Piercing (ADVAP) project is a crit of Ammunition Capabilities Development Documents (CDD) and the Soldier L the requirements for new ammunition to support the rapid prototyping/develop (MTA) authority for rapid prototyping/rapid fielding. New ADVAP ammunition i typical machine gun engagement ranges.	tical technology development in response to the 7.62 milli Lethality Cross Functional Team (SL CFT) Initial Capabilit oment of the Next Generation Squad Weapons (NGSW) u is designed to provide overmatch capability to defeat adva	meter (mm) and 5.56mm Family y Document (ICD) which outlines under the Middle Tier of Acquisition anced light armored threats within
The Next Generation Squad Weapons (NGSW) ammunition is split into two in for the GP ammunition is XM1186 and the nomenclature for the SP ammunitie Release (FMR) ammunition to defeat hard targets. There is no FY 2021 fund	nitial variants, the General Purpose (GP) and the Special on is XM1184. The overall objective of the ADVAP projec ling request.	Purpose (SP). The nomenclature t is to develop and Full Materiel
Project EC3 Ammunition Logistics Prototyping: This Project supports the futur ammunition through the advanced development, integration, and demonstration effectiveness of ammunition operations, to include retrograde, while reducing distribution, and management (strategic and tactical), prognostics, diagnostics packaging and palletization. The efficient deployment and sustainment of relia effectiveness of the ammunition logistics system to ensure the distribution of r and establish an alternate source for monitoring devices, as well as, verifying demonstrate a suite of monitoring technologies, which will be used for assess	re force by improving the distribution, management, reliab on of logistics system enablers. These enablers will impro the logistics footprint on the battlefield. Technology areas s, and asset visibility, explosives safety, and adaptive and able ammunition is vital to success on the battlefield. This reliable ammunition to the warfighter. FY 2021 funding will that issues found during testing have been resolved. FY sing munitions reliability.	vility and survivability of ove the efficiency and addressed include handling, environmentally friendly Project enhances the operational be used to reduce device cost 2021 funding will also be used to
Project EL7 Reduced Range Ammunition: The small caliber Reduced Range millimeter (mm) and .50 caliber Capabilities Development Documents (CDD).	Ammunition (RRA) project is a critical technology develop The overall objective of RRA is to provide training ammu	oment in response to the 7.62 nition 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 material 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. There is no funding requested in FY 2021.

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 I BA 4: Advanced	PE 0603639A I Tank and Medium Caliber Ammunition	
Component Development & Prototypes (ACD&P)		

Project EU3 .50 Caliber APTC: The APTC project is a critical technology development in response to the .50 caliber Munitions Capabilities Development Documents (CDD). The overall objective of APTC is to deliver a single round that replaces and improves current legacy .50 caliber ammunition. The APTC will be compatible with all Army .50 caliber weapons but specifically optimized to work in the M2 Machine Guns. There is no FY 2021 funding request.

Project FA5 APWM: The APWM is focused on advanced risk mitigation, technology integration, prototyping, and product support to identify, evaluate, mature, test, and demonstrate various assured precision prototype technologies in weapon and munitions components and subsystems within a complex system of systems environment. The APWM Project reinforces the National Defense Strategy's major lines of effort through technology development and prototyping, which increases lethality and ensures future combat overmatch success of the Joint Force against peer/near-peer adversaries. This project also aims to improve program performance and affordability for multiple weapons and munitions Programs of Record (PoRs) via Joint Lethality Positioning, Navigation and Timing (PNT) and Army M-Code Global Positioning System (GPS) coordinated efforts. The APWM Project directly supports top Army Modernization Priorities via the Assured-PNT (A-PNT) and LRPF CFT imperatives in support of the National Defense Strategy. FY 2021 funding will support engagement by Weapons and Munitions PNT experts in the development, evaluation, and technology delivery activities of the Air Force's M-Code GPS, Army's PNT related programs, and A-PNT CFT programs in support of LRPF and Counter Area Access/Area Denial missions. Funding will also enable component and subsystem architecture input essential for precision weapons and munitions operating in a NavWar system-of-systems environment, Army M-Code GPS technology integration and evaluation, planning for next generation M-Code GPS integration into the Long Range-Precision Guidance Kit (LR-PGK) as the DoD-selected representative Joint precision munition, and maturation of alternative PNT related technologies and solutions to enable informed A-PNT related PoR milestone and Army cross-functional modernization decisions.

Project FG1 C-DAEM: The Cannon-Delivered Area Effects Munitions (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. FY 2021 funding will support the completion of the C-DAEM Armor competitive demonstration phase, which will identify the most promising candidate(s) to support the Army's modernization priorities in support of the National Defense Strategy.

Project XT5 30mm Anti-Personnel and Counter UAS: Lightweight 30x113mm (LW30) Airburst is a new capability identified as a Warfighter requirement in the Capability Production Document (CPD), AH-64E Helicopter, Increment 1, Version 6. The LW30 airburst cartridge improves the ability of the Warfighter to effectively engage antipersonnel/materiel targets due to increased lethality. Airburst capability provides the user with a much higher probability of achieving a first burst kill against enemy personnel targets in the open. The LW30 will retain its dual purpose warhead, allowing it to continue to defeat light armored threats through point detonation. The cartridge provides increased lethal effects against personnel and soft-skin vehicular targets increasing Soldier Survivability on the ground during troops in contact engagements and decreases the required number of rounds to reach the desired lethal effects. There is no funding requested in FY 2021.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Ar	my			D	ate: February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA Component Development & Prototypes (ACD&P)	4: Advanced	R-1 Program El PE 0603639A / 7	ement (Number/Name) Fank and Medium Calibe) er Ammunition	
B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	FY 2020	FY 2021 Base	FY 2021 OCC) <u>FY 2021 Total</u>
Previous President's Budget	41.921	82.146	50.948	-	50.948
Current President's Budget	40.358	77.696	92.753	-	92.753
Total Adjustments	-1.563	-4.450	41.805	-	41.805
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-4.450			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-1.563	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	41.805	-	41.805

Change Summary Explanation

Increase due to continuation and completion of the Cannon-Delivered Area Effects Munitions (C-DAEM) - Armor (Increment 1) competitive demonstration activities resourced in Project FG1. Increase also attributed to risk reduction and prototype maturation efforts for two parallel Supercharge variants to support concurrent development of Extended Range Cannon Artillery (ERCA) Increment 1C and ERCA Increment 2 (with automated loading system) resourced in Project BQ4.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	Army							Date: Feb	oruary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 06036 Ammunitio	r am Eleme r 39A / Tank on	nt (Number and Mediur	Number/Name) dium Caliber 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
694: Medium Caliber Ammunition	-	1.435	0.000	0.000	-	0.000	0.000	0.000	0.00	0 0.00	0.000	1.435
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
for ground vehicles. Increase pre (JUONS) CC-0558 Counter-Unm XM950 TP ammunition and deve (FY) 2021 funding request.	cision and I anned Aeria lop self-des	ethality cap al Systems structing and	ability to de (C-UAS) to airburst ca	feat person counter the pable mun	ineter (mm inel and ma e rapidly ev itions fired	or sen-destr ateriel target olving threa from the Lig	t of Unman htweight 30	s support the ned Aerial S 0x113mm Li	e Joint Urg systems. T nk Fed Ch	his effort wil ain Gun. Th	nn inked ar onal Need S I qualify the here is no Fi	tatement links and scal Year
B. Accomplishments/Planned P	rograms (S	in Million	<u>s)</u>						F	Y 2019	FY 2020	FY 2021
Title: Linked 30x113mm Ammuni	tion Qualifio	cation and A	Airburst Dev	elopment						1.435	-	-
Description: Qualify linked 30x1 ⁺ munitions.	13mm Perc	ussion Prim	ed XM950 /	Ammunitior	n and devel	op self-dest	ructing and	airburst cap	bable			
					Accompli	shments/P	lanned Pro	grams Sub	totals	1.435	-	-
C. Other Program Funding Sum	mary (\$ in	<u>Millions)</u>										
			<u>FY 2</u>	<u>2021 FY</u>	<u>2021</u> <u>F</u>	<u>Y 2021</u>					Cost To	
Line Item • E09900: CTG, 30mm HEDP, M789, Single, f/Gun M230	<u>FY 20</u> 5.1	0 19 <u>FY 2</u> 105 5.	<u>020</u> <u>E</u> 221 5	<u>323</u> .323	<u>- 0CO</u>	<u>Total</u> <u>F</u> 5.323	5.354	<u>FY 2023</u> 5.357	<u>FY 2024</u> 5.357	<u>FY 2025</u> 5.001	<u>Complete</u> 0.000	<u>1otal Cost</u> 36.718
• E10100: CTG, 30mm TP, M788, Single, f/Gun M230	36.1	133 22.	868 23	.341	-	23.341	27.783	37.278	37.417	36.837	0.000	221.657
<u>Remarks</u>												

D. Acquisition Strategy

30x113mm - An other transaction agreement (OTA) contract was awarded to purchase links for the 30x113mm ammunition. Linked ammunition deliveries will be synchronized with test schedules for ammunition/weapon qualification and Remote Weapon Station (RWS)/vehicle system integration. Ammunition qualification tests and weapon qualification tests will be conducted in FY 2020. Purchase of linked 30x113mm cartridges will transition to competitive procurement by FY 2020. Efforts to develop a self-destructing airburst capable munition and a guided 30x113mm munition will also be conducted.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020			
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (Number/Name)PE 0603639A / Tank and Medium Caliber694 / Medium Caliber AmmunitionAmmunition694 / Medium Caliber Ammunition											
Product Developmer	nt (\$ in M	illions)		FY 2019		FY 2020		FY 2 Ba	2021 ase	FY	2021 CO	FY 2021 Total					
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Aw Cost Date Cost Date		Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract		
30x113mm Self Destruct and Airburst Ammo Development Contract	C/CPFF	Northrop Grumman Innovation Systems (NGIS) : Plymouth, MN	7.771	0.435	Dec 2019	-		-		-		-	0.000	8.206	-		
		Subtotal	7.771	0.435		-		-		-		-	0.000	8.206	N/A		
Support (\$ in Million	Support (\$ in Millions)				2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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		
30x113mm Ammo Combat Capabilities Development Command Armaments Center (CCDC AC)	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny, NJ	-	0.500	Nov 2018	-		-		-		-	0.000	0.500	-		
		Subtotal	-	0.500		-		-		-		-	0.000	0.500	N/A		
Test and Evaluation	(\$ in Milli	ions)		FY	2019	FY	2020	FY	2021 ase	FY	2021 CO	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		
30x113mm Self Destruct Safety Test	MIPR	Aberdeen Testing Center (ATC) : Aberdeen, MD	-	0.300	Dec 2019	-		-		-		-	0.000	0.300	-		
30x113mm Electromagnetic Environment Effects Test	MIPR	Redstone Arsenal : Redstone, Al	-	0.200	Dec 2019	-		-		-		-	0.000	0.200	-		
		Subtotal	-	0.500		-		-		-		-	0.000	0.500	N/A		
PE 0603639A: Tank ar	nd Mediur	n Caliber Ammuniti	on		UN		SIFIED										
Army	my				Page 7 of 87				R-1 Line #83					81			

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	021 Arm	y								Date:	Date: February 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)ProPE 0603639A / Tank and Medium Caliber69-Ammunition69-						Project (Number/Name) 394 / Medium Caliber Ammunition						
Prior Years FY 2019				FY 2	020	FY 202 Base	21	FY 20 OC	021 O	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	7.771	1.435		0.000		-		-		-	0.000	9.206	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	vrmy					Date: February	2020
Appropriation/Budget Activity 2040 / 4		R- PE <i>Ai</i>	1 Program Elemer E 0603639A / Tank a mmunition	Number/Name) dium Caliber Ammunition			
Event Name	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
30x113mm Linked Ammo Development	1 2 3 4	1 2 3	4 1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
30x113mm Linked Proximity Ammo Demonstration	30x113mm Ammo Develo						
30x113mm Linked Self Destruct Safety Certification Test		30x113mm Prox A	immo Demo				
30x113mm Linked Self Destruct System UMR		2 30x113mm Se	elf Destruct System UMR				
				11		1	1]

hibit R-4A, RDT&E Schedule Details: PB 2021 Army				Da	Date: February 2020	
propriation/Budget ActivityR-1 Progra10 / 4PE 060363Ammunition		ent (Number and Mediur	r /Name) m Caliber	Project (Number/Name) 694 <i>I Medium Caliber Ammunition</i>		
	Schedule Details					
		Start		End		
Events	C	Juarter	Year	Qua	arter	Year
30x113mm Events		2	2016	2	2	2017
30x113mm Ammo Development Contract Award		4	2018	2	4	2018
30x113mm Linked Ammo Development		4	0040		4	

2

2

3

30x113mm Linked Proximity Ammo Demonstration

30x113mm Linked Self Destruct System UMR

30x113mm Linked Self Destruct Safety Certification Test

2020

2020

2020

2

2

3

2020

2020
Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	am Elemen 39A / Tank a n	t (Number/ and Medium	Name) Caliber	Project (N BQ4 / 155/	umber/Nan mm Artillery	mber/Name) m Artillery Propulsion XM6 Cost To T FY 2025 Complete C	
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
BQ4: 155mm Artillery Propulsion XM654	-	0.000	7.200	15.705	-	15.705	0.000	0.000	0.000	0.000	0.000	22.905
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Supercharge is a stand-alone top-zone 155 millimeter (mm) propelling charge required to achieve maximum range requirements from the XM1299A1 Extended Range Cannon Artillery (ERCA) Self-Propelled Howitzer (SPH). It will achieve lethality overmatch out to 70 kilometers (km) with developmental extended range projectiles, and will increase range with legacy projectiles by thirty percent. Supercharge is composed of combustible cartridge case (foamed celluloid or felted fiber technology), integral metal Stub Case, electrically initiated primer, and advanced artillery propellant. Fiscal Year (FY) 2021 funding will support design risk reduction and prototype maturation efforts for two parallel Supercharge variants (2-piece bag and cased) to support the concurrent development of ERCA Increment 1C and ERCA Increment 2 (with added automated loading system), which directly supports the Army's Long Range Precision Fires Cross Functional Team priority in support of the National Defense Strategy.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: 155mm Artillery Propulsion Supercharge	-	6.873	15.705
Description: Unitary top-zone propelling charge for XM907E2 Extended Range Cannon with Slide-block breech for use with ERCA Increments 1C and 2 to gain range overmatch for 155mm artillery.			
FY 2020 Plans: Performed charge establishment and charge uniformity in preparation for ballistic testing including preliminary blast overpressure and charge verification across operational temperatures. Performed packaging rough handling testing.			
FY 2021 Plans: FY 2021 funds will continue the support of concurrent design risk reduction and prototype maturation efforts for two Supercharge variants (2-piece bag and cased) to support the acceleration of ERCA Increment 1C and ERCA Increment 2 with automated loading system.			
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 increase to support maturation of two Supercharge variants to support Army modernization requirements to achieve lethality at 70km with precision accuracy by FY 2023.			
Title: FY 2020 SBIR/STTR Transfer	-	0.327	-
Description: Funding transferred in accordance with Title 15 USC ?638			

Exhibit R-2A, RDT&E Project Jus	stification: PB	2021 Army							Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4		R-1 Pi PE 06 <i>Ammu</i>	r ogram Eler 03639A / Ta inition	nent (Numb nk and Medi	Proje BQ4 /	ject (Number/Name) 4 I 155mm Artillery Propulsion XM654					
B. Accomplishments/Planned Pr	ograms (\$ in I	<u>Millions)</u>							FY 2019	FY 2020	FY 2021
FY 2020 Plans: Funding transferred in accordance	with Title 15 U	SC ?638									
FY 2020 to FY 2021 Increase/Dec Funding transferred in accordance	crease Statem with Title 15 U	ent: SC ?638									
				Accon	nplishment	s/Planned P	rograms Su	btotals	-	7.200	15.705
C. Other Program Funding Sumn	nary (\$ in Milli	ons)									
	2 .		FY 2021	FY 2021	FY 2021					Cost To	
Line Item	<u>FY 2019</u>	<u>FY 2020</u>	<u>Base</u>	000	<u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 202</u>	<u>24 FY 202</u>	25 Complete	Total Cost
 232: Advanced Lethality 	70.696	-	0.000	-	0.000	-	-		-	- 0.000	70.696
& Survivability Demo											
• BQ3: 155mm Artillery	-	-	0.000	-	0.000	34.887	25.883	14.8 ⁻	15	- 0.000	75.585
Propulsion XM654											

<u>Remarks</u>

In FY 2022, this Project will transition to Budget Activity 05, Program Element (PE) 0604802A Weapons and Munitions - Eng Dev Project BQ3 155mm Artillery Propulsion XM654. A Procurement of Ammunition, Army (PAA) funding line, Standard Study Number E99350, was established for transition to procurement FY 2022.

D. Acquisition Strategy

The Supercharge Project will consist of critical technology prototyping, testing, and demonstration of two variants: (1) the Urgent Materiel Release (UMR) of Supercharge 2-piece Bag to support the acceleration of the Extended Range Cannon Artillery (ERCA) Increment 1C to achieve lethality at 70km with precision accuracy by FY 2023, and (2) the Full Materiel Release (FMR) of Supercharge Cased to support ERCA Increment 2 with added automated loading system. The Project will utilize the Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) for the integration of components such as propellant, combustible case, igniter and stub case. Upon design maturation, the Supercharge 2-piece Bag will transition and conduct Engineering Manufacturing and Development (EMD) tasks to qualify the design for UMR to support the ERCA Increment 1C First Unit Issues (FUI). The Supercharge Cased will require additional developmental testing and qualification for Low Rate Initial Production (LRIP) to support ERCA Increment 2. Federal Acquisition Regulation (FAR) based production contract(s) will be awarded after the Supercharge Cased Milestone C for LRIP and Full Rate Production (FRP).

Exhibit R-3, RDT&E I	Project Co	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1			R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition						Project (Number/Name) BQ4 <i>I 155mm Artillery Propulsion XM654</i>				
Management Service	es (\$ in M	illions)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2 O	2021 CO	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	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	-		0.185	Jan 2020	0.500	Oct 2020	-		0.500	0.000	0.685	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.327		-		-		-	0.000	0.327	-
		Subtotal	-	-		0.512		0.500		-		0.500	0.000	1.012	N/A

<u>Remarks</u>

Program Management reflects Supercharge travel and milestone documentation support. Fiscal Year (FY) 2021 increase required to support the significant increase in test activities.

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
Supercharge Prototype Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	-	-		2.625	Mar 2020	7.705	Nov 2020	-		7.705	0.000	10.330	-
Developmental Projectile/ Fuze Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	-	-		0.965	Mar 2020	1.100	Nov 2020	-		1.100	0.000	2.065	-
	Subtota			-		3.590		8.805		-		8.805	0.000	12.395	N/A

Remarks

FY 2021 increase to support prototype maturation of two Supercharge variants to support Army modernization requirements to achieve lethality at 70 kilometers (km) with precision accuracy by FY 2023.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 <i>Ammun</i>	ogram Ele 3639A / 7 hition	ement (N ank and l	umber/Na Medium C	ame) Caliber	Project BQ4 / 1	(Number 55mm Art	r/ Name) tillery Prop	oulsion X	M654
Support (\$ in Million	is)			FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY	2021 CO	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	-	-		1.684	Jan 2020	2.125	Oct 2020	-		2.125	0.000	3.809	-
		Subtotal	-	-		1.684		2.125		-		2.125	0.000	3.809	N/A
Remarks Engineering support requir	red for ongoi	ing design risk reduction	and prototy	ype maturat	tion efforts c	of two Super	charge varia	ants. FY 2	2021	FY	2021	FY 2021]		
Test and Evaluation	(\$ IN WIII	ions)		FY 2	2019	FY 2	2020	Ва	ise	0	co	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
Supercharge Prototype Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	-		1.414	Apr 2020	4.275	Jan 2021	-		4.275	0.000	5.689	-
	L	Subtotal	-	-		1.414		4.275		-		4.275	0.000	5.689	N/A
Remarks Additional FY 2021 testing	activities re	quired for ongoing desig	ın risk reduc	ction and pr	ototype mat	turation effor	rts of two Su	ipercharge	variants.			-			
			Prior Years	FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY : O	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		7.200		15.705		-		15.705	0.000	22.905	N/A
<u>Remarks</u>															

Exhibit R-4, RDT&E Schedule Profile: PB 2021	Army							Date: Fe	ebruary	2020	
Appropriation/Budget Activity 2040 / 4			R-1 P I PE 06 <i>Amm</i> L	rogram Elemer 03639A / Tank a unition	Project (N BQ4 / 155	ct (Number/Name) 155mm Artillery Propulsion XM654					
Event Name	FY 2019	FY 20	20	FY 2021	FY 2022		FY 2023	FY 2	2024	F	(2025
Event Name	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3	4 1	2 3 4	1 2	3 4	1 2	3 4
Supercharge 2-piece Bag (UMR Variant)											
Bag Preliminary Design Review (PDR)											
Bag Prototype Development & Testing		Protot	typing & Te	esting							
Bag Critical Design Review (CDR)				•							
Bag Qualification Testing					Qualification Testing						
Bag Urgent Materiel Release (UMR)											
ERCA Increment 1C First Unit Issues (FUI)							5 ERC4	Inc 1C FUI			
Supercharge Cased (FMR Variant)											
Cased PDR			<mark>_3</mark> ₽⊂	DR .							
Cased Prototype Development			P	Prototyping							
Cased Developmental Testing					Developmental Testin	9					
Cased Qualification Testing						unification 7	To ation				
						Jaincation	resung				

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (N BQ4 / 155r	umber/Name) nm Artillery Propulsion XM654

<u>Note</u>

Schedule reflects design risk reduction and prototype maturation efforts for two parallel Supercharge variants (2-piece bag and cased) required to support the concurrent development of the Extended Range Cannon Artillery (ERCA) Increment 1C (accelerated to achieve precision accuracy at 70km range by FY 2023) and ERCA Increment 2 (with added automated loading system).

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Feb	ruary 2020	
ppropriation/Budget Activity 040 / 4	R-1 Program I PE 0603639A <i>Ammunition</i>	Element (Numbe I Tank and Mediu	r /Name) m Caliber	Project (Number/Name) BQ4 <i>I 155mm Artillery Propulsion XM</i>		
	Schedule Details	3				
	[St	art	E	nd	
Events		Quarter	Year	Quarter	Year	
Supercharge 2-piece Bag (UMR Variant)		1	2020	3	2022	
Bag Preliminary Design Review (PDR)		2	2020	2	2020	
Bag Prototype Development & Testing		2	2020	4	2021	
Bag Critical Design Review (CDR)		4	2020	4	2020	
Bag Qualification Testing		1	2022	3	2022	
Bag Urgent Materiel Release (UMR)		3	2022	3	2022	
ERCA Increment 1C First Unit Issues (FUI)		4	2023	4	2023	
Supercharge Cased (FMR Variant)		1	2020	4	2025	
Cased PDR		1	2021	1	2021	
Cased Prototype Development		1	2021	4	2021	
Cased Developmental Testing		1	2022	3	2022	
Cased Qualification Testing		4	2022	4	2025	

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name)ProPE 0603639A / Tank and Medium CaliberEBSAmmunitionEBS					umber/Nan . for Small (nunition	
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
EB8: OWL for Small Caliber Ammunition	-	1.984	2.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.984
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
<u>Note</u> Project EB8 One-Way Luminesce	ence (OWL)) for Small C	aliber fundi	ng transitio	ned to Bude	get Activity (BA) 5 Prog	ram Eleme	nt (PE) 0604	1802A Wea	pons and M	unitions -

Eng Dev Weapons and Munitions - Eng Dev Project EP4 OWL Small Caliber Ammo.

A. Mission Description and Budget Item Justification

The 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 project's objective is to develop and field a full tracer round to 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 followed by a similar development strategy for .50 caliber cartridges. There is no Fiscal Year (FY) 2021 funding request.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Technology Maturation and Risk Reduction (TMRR)	1.984	1.909	-
Description: OWL will develop and demonstrate a full tracer technology that eliminates the shortcomings of current legacy tracers.			
FY 2020 Plans: FY 2020 efforts continued activities to mature 5.56mm Technology Readiness Level (TRL). Plans included testing 5.56mm prototype solutions in preparation for TRL 6. Evaluate .50 Caliber and Next Generation Weapon Systems (NGSW) small caliber ammunition OWL technology/prototype ammunition and mature TRLs.			
FY 2020 to FY 2021 Increase/Decrease Statement: Project EB8 OWL for Small Caliber funding transitioned to BA 5 PE 0604802A Weapons and Munitions - Eng Dev Weapons and Munitions - Eng Dev Project EP4 OWL Small Caliber Ammo.			
Title: FY 2020 SBIR/STTR Transfer	-	0.091	-
Description: Funding transferred in accordance with Title 15 USC ?638			
FY 2020 Plans:			

PE 0603639A: *Tank and Medium Caliber Ammunition* Army

Exhibit R-2A, RDT&E Project Just	fication: PB	2021 Army							Date:	February 2020)	
Appropriation/Budget Activity R-1 Program Element (Number/Name) 2040 / 4 PE 0603639A / Tank and Medium Calibe Ammunition Ammunition								Proje EB8 /	Project (Number/Name) EB8 / OWL for Small Caliber Ammunit			
B. Accomplishments/Planned Pro Funding transferred in accordance w	g<u>rams (\$ in N</u> /ith Title 15 U	<u>Aillions)</u> SC ?638							FY 2019	FY 2020	FY 2021	
FY 2020 to FY 2021 Increase/Decr Funding transferred in accordance w	e ase Statem /ith Title 15 U	ent: SC ?638										
				Accon	nplishments	s/Planned P	rograms Sul	btotals	1.98	4 2.000	-	
C. Other Program Funding Summa	ary (\$ in Milli	<u>ons)</u>	FY 2021	FY 2021	FY 2021					Cost To)	
Line Item	000	Total	FY 2022	FY 2023	<u>FY 202</u>	24 <u>FY 20</u>	25 Complete	Total Cost				
• EP4: One-Way Luminescence for Small Caliber Ammo	5.855	8.547	13.977	-	13.977	6.981	7.393	2.99	98	- 0.000	45.751	
<u>Remarks</u>												

Project EB8 OWL for Small Caliber funding transitioned to BA 5 PE 0604802A Weapons and Munitions - Eng Dev Weapons and Munitions - Eng Dev Project EP4 OWL Small Caliber Ammo.

D. Acquisition Strategy

The OWL technology will be integrated into the M80A1 trace ammunition production. 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 Engineering and Manufacturing Development (EMD) in FY 2019. The 5.56mm and .50 caliber cartridges will follow the 7.62mm schedule with EMD scheduled to commence in FY 2021 for the 5.56mm variant. The new 5.56mm tracer cartridges will replace the legacy 5.56mm M856A1 tracer.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 <i>Ammur</i>	ogram Ele 3639A / 7 nition	ement (N Tank and	l umber/N Medium (ame) Caliber	Project EB8 / C	WL for S	r/Name) mall Calibo	er Ammu	nition
Management Service	es (\$ in M	lillions)		FY	2019	FY :	2020	FY 2 Ba	2021 ase	FY :	2021 CO	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	-	-		0.091		-		-		-	0.000	0.091	-
		Subtotal	-	-		0.091		-		-		-	0.000	0.091	N/A
Product Developmer	nt (\$ in M	illions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY	2021 CO	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
Tooling Development	Option/ CPFF	JAK Tool Engineering Solutions : Cranbury, NJ	-	0.780	Feb 2019	0.238	Feb 2020	-		-		-	0.000	1.018	Continuing
Prototype Development Contract 1	Option/ CPFF	General Dynamics : Florham Park, NJ	0.515	-		0.388	Feb 2020	-		-		-	0.000	0.903	Continuing
Prototype Development Contract 2	Option/ CPFF	Nammo Tally : Mesa, AZ	0.515	-		0.388	Feb 2020	-		-		-	0.000	0.903	Continuing
		Subtotal	1.030	0.780		1.014		-		-		-	0.000	2.824	N/A
Support (\$ in Million	s)			FY	2019	FY	2020	FY 2 Ba	2021 ase	FY	2021 CO	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)	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny, NJ	5.472	1.136	Oct 2018	0.564	Oct 2019	-		-		-	2.498	9.670	Continuing
Development Support	Option/ FFP	Leidos Inc. : Reston, VA	-	0.068	Feb 2019	-		-		-		-	0.000	0.068	-
		Subtotal	5.472	1.204		0.564		-		-		-	2.498	9.738	N/A

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	,				R-1 Pro PE 060 Ammun	gram Ele 3639A / 7 iition	ement (N ank and	umber/N Medium (ame) Caliber	Project EB8 / O	(Number WL for Si	r/Name) mall Calibe	er Ammu	nition
Test and Evaluation (\$ in Milli	ons)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Army Research Lab (ARL)	MIPR	Army Research Lab (ARL) : Aberdeen, MD	0.278	-		0.029	Oct 2019	-		-		-	1.500	1.807	Continuing
Army Corps of Engineers	MIPR	Army Corps of Engineers : Vicksburg, MO	0.388	-		0.024	Oct 2019	-		-		-	1.500	1.912	Continuing
Army Joint Munitions Command	MIPR	Army Joint Munitions Command : Rock Island, IL	0.204	-		0.039	Oct 2019	-		-		-	0.000	0.243	-
Prototype testing	Option/ FFP	Double B Enterprises : Malvern, IA	0.200	-		0.239	Feb 2020	-		-		-	0.000	0.439	Continuing
	Subtotal 1.07					0.331		-		-		-	3.000	4.401	N/A
Pri Yea			Prior Years	FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	7.572	1.984		2.000		-		-		-	5.498	17.054	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy						Date: February	2020
Appropriation/Budget Activity 2040 / 4			R-1 I PE 0 <i>Amn</i>	Program Elem 603639A / Tani nunition	e nt (Number/Nar k and Medium Ca	ne) Project (N liber EB8 / OW	Number/Name) /L for Small Calib	er Ammunition
	FY 2019	FY 20	20	FY 2021	FY 2022	EY 2023	FY 2024	FY 2025
Event Name	1 2 3 4	1 2 3	4	1 2 3	4 1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
7.62mm Multiple Concept Design Evaluation	7.62mm Multiple Concept	Design Evaluatio	'n					
7.62mm Milestone B (MS-B)	1 2mm MS-B							
7.62mm Transitions from BA04 EB8 to BA05 EP4 7.62m	2 n BA04 to BA05 Transition	•						
7.62mm Engineering and Manufacturing Development (EMD)	7.62mm EMD							
7.62mm Design Verification Test	7.62mm DVT							
7.62mm Preliminary Design Review (PDR)	3 7.62mm Pt	R						
7.62mm User Assessment			7.62n	m User Assessment				
7.62mm Pre-Production Qualification Test (PPQT)			7.62n	m PPQT				
7.62mm Critical Design Review (CDR)				7.62mm CDR				
7.62mm Development Test & Evaluation (DT&E)		7	.62mm D	T&E				
7.62mm Production Qualification Test (PQT)				7.6	2mm PQT			
7.62mm Live Fire Test and Evaluation (LFT&E)				7.6	2mm LFT&E			
7.62mm Limited User Evaluation (LUE)				7.6	2mm LUE			

Appropriation/Budget Activity 2040 / 4 R-1 Program Element (Number/Name) Resources Project (Number/Name) Project (Number/Name) Bell / Withow Sources Event Name FY 2019 FY 2020 FY 2021 FY 202 FY 2024 FY 202	Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	ibit R-4, RDT&E Schedule Profile: PB 2021 Army																		Dat	:e: F	ebru	lary	2020)		
Pry 2019 Pry 201 Pry 2022 Pry 2024 Pry 2014 Pry 2014 <th< th=""><th>Appropriation/Budget Activity 2040 / 4</th><th></th><th></th><th></th><th></th><th></th><th>R P <i>A</i></th><th>R-1 Pi PE 06</th><th>rogı 036 ınitid</th><th>ram 39A on</th><th>Elem I Tan</th><th>ent k a</th><th>t (Nu nd M</th><th>imb 1edi</th><th>er/Nan ium Cal</th><th>iber</th><th>Pro EB</th><th>oject 8 / C</th><th>: (N)///L</th><th>umt for</th><th>oer/N Sma</th><th>Nam all C</th><th>e) alibe</th><th>er An</th><th>nmu</th><th>nitio</th><th>n</th></th<>	Appropriation/Budget Activity 2040 / 4						R P <i>A</i>	R-1 Pi PE 06	r ogı 036 ınitid	r am 39A on	Elem I Tan	ent k a	t (Nu nd M	imb 1edi	er/Nan ium Cal	ibe r	Pro EB	oject 8 / C	: (N)///L	umt for	oer/N Sma	Nam all C	e) alibe	er An	nmu	nitio	n
Event Name 1 2 3 4 1	EventNeme		FY	2019		FY	2020	b		FY	2021			FY	2022		FY 2	023			FY	202	4		FY	202	5
7.62mm Multiple Concept Design Evaluation Some Multiple Concept Design Text Some Multiple Concept Design Text 5.66mm Cavity Design Text Some Multiple Concept Design Text Some Multiple Concept Design Text 5.66mm Technology Readiness Level 6 Some Multiple Concept Design Text Some Multiple Concept Design Text 5.66mm Mileshone 6 (MS-8) Some Multiple Concept Design Text Some Multiple Concept Design Text Some Multiple Concept Design Text 5.66mm Transitions from BA04 EB8 to BA05 EP4 Some Multiple Concept Design Text Some Multiple Concept Design Text Some Multiple Concept Design Text 5.66mm Transitions from BA04 EB8 to BA05 EP4 Some Multiple Concept Design Text 5.66mm Transitions from BA04 EB8 to BA05 EP4 Some Multiple Concept Design Text Some Multipl	Event Name	1	2	3 4	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 Multiple Concept Design Evaluation 5.56mm Multiple Concept Design Evaluation 9.56mm Multiple Concept Design Evaluation 5.56mm Cavity Design Test 5.56 Cavity Design Test 9.560 Test of 5.56 mm MS-8 5.56mm Milestone B (MS-B) 5.66 mm MS-8 9.560 Test of 5.56 mm MS-8 5.56mm Engineering and Manufacturing Development (EMD) 5.56 mm BA04 to BA05 Tensito 9.560 mm VT 5.56mm Design Verification Test 5.56 mm MS-8 9.560 mm VT 9.560 mm VT 5.56mm Devision Verification Test 5.56 mm MS-8 9.560 mm VT 9.560 mm VT 5.56mm Devision Verification Test 6.60 mm PDR 9.560 mm VT 9.560 mm VT 5.56mm Devision Verification Test 6.60 mm PDR 9.560 mm VT 9.560 mm VT 5.56mm Devision Verification Test 6.60 mm PDR 9.560 mm VT 9.560 mm VT 5.56mm Devision Verification Test 6.60 mm PDR 9.60 mm VT 9.60 mm VT 5.56mm Devision Verification Test 6.60 mm VER 9.60 mm VT 9.60 mm VT 5.56mm Devision Verification Test 6.60 mm VER 9.60 mm VT 9.60 mm VT 9.60 mm VT 5.56mm Devision Verification Test 6.60 mm VER 6.60 mm VER 9.60 mm VT 9.60 mm VT 5.56mm D	7.62mm Milestone C													;	9 7.62mm MS	-9											
5.56mm Cavity Design Test 5.56 Cavity Design Test<	5.56mm Multiple Concept Design Evaluation	5 56m	n Mul	inle Concer	at Desig	in Eval	uation																				
5.56mm Technology Readiness Level 6 5.56mm Milestone B (MS-B) 5.56mm Transitions from BA04 EB8 to BA05 EP4 5.56mm Engineering and Manufacturing Development (EMD) 5.56mm Design Verification Test 5.56mm Verification Test 5.56mm ODR 5.56mm ODR 5.56mm Development Test & Evaluation (DT&E) 5.56mm Production Qualification Testing (PQT)	5.56mm Cavity Design Test				5.5	i6 Cavi	tv Desig	n Test																			
5.56mm Milestone B (MS-B) 5.56mm MS-B 5.56mm MS-B 5.56mm MS-B 5.56mm Transitions from BA04 EBS to BA05 EP4 5.56mm BA04 to BA05 Transition 5.56mm DVT 5.56mm Engineering and Manufacturing Development (EMD) 5.56mm DVT 5.56mm DVT 5.56mm Preliminary Design Review (PDR) 5.56mm PDR 5.56mm PDR 5.56mm Cutcal Design Review (CDR) 5.56mm Cutcal Design Review (CDR) 5.56mm Cutcal Design Review (CDR) 5.56mm Development Test & Evaluation (DT&E) 5.56mm Production Qualification Testing (PQT) 5.56mm PCutcal Design Review (CDR)	5.56mm Technology Readiness Level 6						5.5		5																		
5.56mm Transitions from BA04 EB8 to BA05 EP4 5.56mm EA04 to BA05 to BA05 to BA05 to BA05 Transition 5.56mm Engineering and Manufacturing Development (EMD) 5.56mm EMD 5.56mm Design Verification Test 5.56mm EMD 5.56mm Preliminary Design Review (PDR) 5.56mm PDR 5.56mm Critical Design Review (CDR) 5.56mm CuR 5.56mm Development Test & Evaluation (DT&E) 5.66mm PCR 5.56mm Production Qualification Testing (PQT) 5.66mm PCR	5.56mm Milestone B (MS-B)							5.56	imm M	1S-B																	
5.56mm Engineering and Manufacturing Development (EMD) 5.56mm Design Verification Test 5.56mm Preliminary Design Review (PDR) 5.56mm User Assessment 5.56mm Critical Design Review (CDR) 5.56mm Development Test & Evaluation (DT&E) 5.56mm Production Qualification Testing (PQT)	5.56mm Transitions from BA04 EB8 to BA05 EP4						5	6 5. 56m m	BA04	to BA)5 Trans	ition															
5.56mm Design Verification Test S.66mm DVT 5.56mm Preliminary Design Review (PDR) S.66mm PDR 5.56mm User Assessment S.66mm PDR 5.56mm Critical Design Review (CDR) S.66mm CDR 5.56mm Development Test & Evaluation (DT&E) S.66mm DT&E 5.56mm Production Qualification Testing (PQT) S.66mm DT	5.56mm Engineering and Manufacturing Development (EMD)								5.5	56mm I	MD																
5.56mm Preliminary Design Review (PDR) 8	5.56mm Design Verification Test										5.6	56m	m DVT														
5.56mm User Assessment 5.56mm User Assessment 5.56mm User Assessment 10 5.56mm Critical Design Review (CDR) 5.56mm CDR 5.56mm CDR 10 5.56mm Development Test & Evaluation (DT&E) 5.56mm DT&E 5.56mm DT&E 5.56mm DT&E 5.56mm Production Qualification Testing (PQT) 5.56mm DT&E 5.56mm DT&E 5.56mm PQT	5.56mm Preliminary Design Review (PDR)											5.5	8 6mm P	DR													
5.56mm Critical Design Review (CDR) 10 5.56mm Development Test & Evaluation (DT&E) 5.56mm CDR 5.56mm Production Qualification Testing (PQT) 5.56mm DT&E	5.56mm User Assessment												5.56	mm U	ser Assess	nent											
5.56mm Development Test & Evaluation (DT&E) 5.56mm Production Qualification Testing (PQT)	5.56mm Critical Design Review (CDR)														5.56	nm CDR											
5.56mm Production Qualification Testing (PQT)	5.56mm Development Test & Evaluation (DT&E)															5.56mm	DT&E										
	5.56mm Production Qualification Testing (PQT)																	5.	56m	n PQT							



whibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Feb	ruary 2020
opropriation/Budget Activity 40 / 4	R-1 Program PE 0603639A <i>Ammunition</i>	Element (Numbe I Tank and Mediu	r/Name) m Caliber	Project (Number/Nar EB8 / OWL for Small	ne) Caliber Ammunition
	Schedule Detail	S			
		Sta	art	E	nd
Events		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
5.56mm Technology Readiness Level 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
			1		-L

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army					Date: Febr	uary 2020
ppropriation/Budget Activity 040 / 4	R-1 Program PE 0603639A <i>Ammunition</i>	Element (Numbe I Tank and Mediu	r/Name) m Caliber	Project EB8 / O	(Number/Nan WL for Small (1e) Caliber Ammunition
		St	art		E	nd
Events		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
NGSW & .50 caliber Concept Design Evaluation		1	2020		2	2021

Note

As the technology matures, Project EB8 One-Way Luminescence (OWL) for Small Caliber funding transitioned to Budget Activity (BA) 5 Program Element (PE) 0604802A Weapons and Munitions - Eng Dev Weapons and Munitions - Eng Dev Project EP4 OWL Small Caliber Ammo.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	am Elemen t 39A / Tank a n	t (Number/ nd Medium	Name) Caliber	Project (N EB9 / Aviat Counterme	umber/Nan tion Airborn easures	ne) e Expendab	le
COST (\$ in Millions)	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	0.000	0.000	0.000	18.740
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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.

A. Mission Description and Budget Item Justification

Project EB9 Aviation Airborne Expendable Countermeasure (AAECM) supports the advanced development activities and technology demonstrations of the AAECM to include the XM215 Flare and XM20 Radio Frequency (RF) expendables. These expendable countermeasures systems are essential parts 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 the 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. This program will evaluate integrated technologies and countermeasure prototype systems in realistic operating test environments. Prototypes will demonstrate component and subsystem maturity prior to integration into major Army aircraft platforms. FY 2021 supports initial developmental/operational testing on XM215 and RF Countermeasures (CM).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Expendable Countermeasures to Guided Missile Threats	5.004	3.041	4.496
Description: This program will develop expendable CM decoys which will protect Army aircraft from surface-to-air missiles.			
FY 2020 Plans: Conducted optimization for the XM215 during Technology Maturation & Risk Reduction (TMRR), System Requirements Review (SRR) and flight testing. Continued maturing prototype design and technology and Pre-Engineering and Manufacturing Development (EMD) review. Prepared Initial documentation to support Milestone B for Radio Frequency (RF) Countermeasures (CM). Conducted Pre-EMD review and Preliminary Design Review (PDR) for RF CM.			
FY 2021 Plans:			

Exhibit R-2A, RDT&E Project Justi	fication: PB	2021 Army							Date: Fe	ebruary 2020				
Appropriation/Budget Activity 2040 / 4				R-1 Pi PE 06 <i>Ammu</i>	rogram Eler 03639A / Ta Inition	nent (Numb nk and Medi	er/Name) um Caliber	Projec EB9 / A Counte	t (Number/N Aviation Airbo ermeasures	l ame) orne Expenda	ible			
B. Accomplishments/Planned Prog	grams (\$ in I	<u> ////////////////////////////////////</u>						Γ	FY 2019	FY 2020	FY 2021			
Transition from Technology Maturati Modeling and Simulation efforts.	on & Risk Re	duction (TMI	RR) to EMD	Phase of pr	ogram and c	complete flig	nt testing and	b						
FY 2020 to FY 2021 Increase/Decre Increase from FY 2020 to FY 2021 d	e ase Statem lue to addition	ent: nal testing ar	nd modeling	and simulati	ion requirem	ents.								
Title: FY 2020 SBIR/STTR Transfer	Y 2020 SBIR/STTR Transfer													
Description: Funding transferred in	<i>ption:</i> Funding transferred in accordance with Title 15 USC ?638													
FY 2020 Plans: Funding transferred in accordance w	vith Title 15 U	SC ?638												
FY 2020 to FY 2021 Increase/Decre Funding transferred in accordance w	e ase Statem ⁄ith Title 15 U	ent: SC ?638												
				Accon	nplishment	s/Planned P	rograms Su	btotals	5.004	3.186	4.496			
C. Other Program Funding Summa	ary (\$ in Milli	ons <u>)</u>												
			FY 2021	<u>FY 2021</u>	FY 2021					Cost To				
Line Item	<u>FY 2019</u>	FY 2020	Base	000	Total	FY 2022	<u>FY 2023</u>	<u>FY 202</u>	4 <u>FY 202</u>	5 <u>Complete</u>	Total Cost			
• EPT: Aviation Airborne Expendable Countermeasures	-	4.920	4.470	-	4.470	8.241	-	-	-	0.000	17.037			
<u>Remarks</u>														

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.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 <i>Ammur</i>	ogram Ele 3639A / 7 hition	ement (N Fank and	l umber/N Medium (ame) Caliber	Project EB9 / A Counte	t (Numbe viation Ai rmeasure	r/Name) rborne Ex s	pendable)
Management Service	es (\$ in M	lillions)		FY	2019	FY	2020	FY 2 Ba	2021 Ise	FY	2021 CO	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	-	-		0.145		-		-		-	0.000	0.145	-
		Subtotal	-	-		0.145		-		-		-	0.000	0.145	N/A
Product Developme	nt (\$ in M	illions)		FY	2019	FY :	2020	FY 2 Ba	2021 Ise	FY :	2021 CO	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	2.638	0.894	Nov 2018	-		-		-		-	0.000	3.532	-
RF Development	C/FFP	CCDC Armaments Center : Picatinny Arsenal, NJ	0.773	0.787	Jun 2019	1.401	Jan 2020	-		-		-	0.000	2.961	-
		Subtotal	3.411	1.681		1.401		-		-		-	0.000	6.493	N/A
Support (\$ in Million	is)		ſ	FY	2019	FY :	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
RF Engineering Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	0.650	-		0.588	Jan 2020	0.500	Oct 2020	-		0.500	0.000	1.738	-
		Subtotal	0.650	-		0.588		0.500		-		0.500	0.000	1.738	N/A
Test and Evaluation	est and Evaluation (\$ in Millions)				2019	FY	2020	FY 2 Ba	2021 Ise	FY	2021 CO	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 Test and Evaluation	MIPR	Various : Various	2.732	1.468	Apr 2019	-		-		-		-	0.000	4.200	-

PE 0603639A: *Tank and Medium Caliber Ammunition* Army

Exhibit R-3, RDT&E P	Project Co	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	,				R-1 Pro PE 060 Ammun	ogram Ele 3639A / Ta hition	ment (N ank and l	umber/N a Medium C	a me) Saliber	Project EB9 / A Counter	(Number viation Air measures	r/ Name) borne Exp s	oendable	
Test and Evaluation ((\$ in Milli	ons)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2 OC	2021 CO	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
RF Flight Test and Evaluation	MIPR	Various : Various	0.705	1.855	Jul 2019	1.052	May 2020	-		-		-	0.000	3.612	-
RF Modeling & Simulation	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	1.072	-		-		0.500	Dec 2020	-		0.500	0.000	1.572	-
RF Design Verification and Flight Testing	TBD	TBD : TBD	-	-		-		3.496	Dec 2020	-		3.496	0.000	3.496	-
		Subtotal	4.509	3.323		1.052		3.996		-		3.996	0.000	12.880	N/A
	Prior Years	FY 2	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
		Project Cost Totals	8.570	5.004		3.186		4.496		-		4.496	0.000	21.256	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021	Army										Date:	February	2020	
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 <i>Amm</i>	P rogram 603639A unition	Elemer I Tank a	nt (Nun and Me	n ber/Na edium C	me) aliber	Proj EB9 Cou	ect (N I Avia nterm	Number/ ation Airl easures	Name) borne Exp	pendable	
Event Name	FY 2019	FY 202	20	FY	2021	F	Y 2022		FY 20	23	FY	2024	FY	2025
XM215 Development	1 2 3 4	1 2 3	4	1 2	3 4	1 3	2 3	4 1	2	3 4	1 2	3 4	1 2	3 4
XM215 Milestone A														
XM215 Prototyping	XM215 Prototyping													
XM215 Down Select	3 XM215 DS													
XM215 Testing Efforts (Stability/Heat/Cold)	XM215 Te	sting												
XM215 Flight Testing		XM215 Flight	Test											
XM215 Milestone B		4 XM215 MS-	в											
XM215 Engineering and Manufacturing Development		XM215 E	MD											
XM215 Design Verification Test				XM21	5 DVT									
XM215 Flight Test					XM215	Flight Test								
XM215 Milestone C						×M	1215 DT/OT		A					
Radio Frequency (RF) Development									XM215 M	8-C				
								•						

xhibit R-4, RDT&E Schedule Profile: PB 2021 Army Date: February 2020																												
Appropriation/Budget ActivityR-1 Program Element (Number/Nam2040 / 4PE 0603639A / Tank and Medium CaliAmmunitionAmmunition											e) ber	P E C	Proje EB9 Cour	e ct (N I Avia nterm	luml ation easu	b er/l Airb ıres	Nam orne	e) Exp	enda	able								
Event Name		FY	201	19		FY	202	20		FY	202	1		FY	202	22		FY	20	23		FY	202	4		FY	2028	5
RF Milestone A		<u>2</u>	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
RF Prototype Development	RF P	rototyp	oing																									
RF Demonstrations		RF	Demo	,																								
RF Flight Testing 1				RF FI	ight Te	est 1																						
RF Data Analysis				R	de Mis-	8 Prep																						
RF Milestone B						Ċ	5 RE M	IS-В																				
RF Development Contract							RF	EMD																				
RF Qualification Build									RF Q	ual Bui	ы																	
RF Critical Design Review										RF	CDR																	
RF Production Qualification Testing										F	FPQT																	
RF Developmental Test and Evaluation											R	F DT&	E															
RF Milestone C														5-0														
													i ci ivic															

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: Febru	ary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0603639A <i>Ammunition</i>	Element (Numbe I Tank and Mediu	r/Name) m Caliber	Project (Number/Nam EB9 <i>I Aviation Airborne</i> <i>Countermeasures</i>	e) Expendable
	Schedule Details	S			
		St	art	En	d
Events		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 Engineering and Manufacturing Development		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
Radio Frequency (RF) Development		1	2019	4	2025
RF Milestone A		1	2019	1	2019
RF Prototype Development		1	2019	4	2019
RF Demonstrations		2	2019	3	2019
RF Flight Testing 1		4	2019	4	2019
RF Data Analysis		4	2019	3	2020
RF Milestone B		3	2020	3	2020
RF Development Contract		3	2020	1	2022
RF Qualification Build		1	2021	2	2021
RF Critical Design Review		2	2021	2	2021

Exh	Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army Date: February 2020												
App 204	propriation/Budget Activity 0 / 4	R-1 Program PE 0603639A Ammunition	Element (Numbe I Tank and Mediu	r/Name) m Caliber	Project (EB9 / Av Countern	Number/Nar ation Airborr neasures	ne) e Expendable						
			Sta	art		E	nd						
	Events		Quarter	Year		Quarter	Year						
	RF Production Qualification Testing		2	2021		3	2021						
	RF Developmental Test and Evaluation		3	2021		4	2021						
	RF Milestone C		1	2022		1	2022						

Exhibit R-2A, RDT&E Project Ju		Date: Febr	uary 2020									
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	am Elemen 9A / Tank a n	t (Number/ and Medium	Name) Caliber	Project (N EC2 I Adv Small Cal J	umber/Nan Armor-Piero Ammo	ne) cing (ADVAF	P) for
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
EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	5.334	6.821	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.155
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2020 Project EC2 Adv Armor-Piercing (ADVAP) Small Cal Ammo funding transitioned to Budget Activity (BA) 5 Program Element (PE) 0604802A Weapons and Munitions - Eng Dev Project FL4 Small Caliber Ammo Next Gen Squad Weapons.

A. Mission Description and Budget Item Justification

The 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) and the Soldier Lethality Cross Functional Team (SL CFT) Initial Capability Document (ICD) which outlines the requirements for new ammunition to support the rapid prototyping/development of the Next Generation Squad Weapons (NGSW) under the Middle Tier of Acquisition (MTA) authority for rapid prototyping/rapid fielding. New ADVAP ammunition is designed to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges.

The Next Generation Squad Weapons (NGSW) ammunition is split into two initial variants, the General Purpose (GP) and the Special Purpose (SP). The nomenclature for the GP ammunition is XM1186 and the nomenclature for the SP ammunition is XM1184. The overall objective of the ADVAP project is to develop and Full Materiel Release (FMR) ammunition to defeat hard targets.

There is no Fiscal Year (FY) 2021 funding request.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Small Caliber Ammunition Rapid Prototyping	5.334	6.821	-
Description: Develop, demonstrate, and qualify small caliber ADVAP cartridges that can defeat threat targets and provide overmatch capability versus a broad spectrum of hard targets.			
<i>FY 2020 Plans:</i> FY 2020 efforts were focused on continuing rapid prototyping/development of the SP projectile, built prototypes and maturing prototypes to provide to the weapon system contractors for performance evaluation, conducted a Critical Design Review (CDR), and conducted prototype testing. Also, conducted a Preliminary Design Review (PDR) for the SP projectile and performed activities to increase prototype capacity to support planned weapon system testing beginning in FY 2021 and FY 2022. <i>FY 2020 to FY 2021 Increase/Decrease Statement:</i>			

Exhibit R-2A, RDT&E Project Justi		Date: Fe	bruary 2020											
Appropriation/Budget Activity 2040 / 4				R-1 Pr PE 06 <i>Ammu</i>	r ogram Eler 03639A / Ta Inition	nent (Numb nk and Medi	er/Name) um Caliber	Projec EC2 / A Small (t (Number/N Ndv Armor-Pi Cal Ammo	a me) ercing (ADVA	NP) for			
B. Accomplishments/Planned Prog	grams (\$ in N	<u>/lillions)</u>							FY 2019	FY 2020	FY 2021			
Project EC2 Adv Armor-Piercing (AD Eng Dev Project EP5 Adv Armor Pier Weapons.	tions - quad													
				Accon	nplishments	s/Planned P	rograms Su	btotals	5.334	6.821	-			
C. Other Program Funding Summa	ry (\$ in Milli	ons <u>)</u>												
			<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>					<u>Cost To</u>				
Line Item	<u>FY 2019</u>	<u>FY 2020</u>	Base	000	<u>Total</u>	FY 2022	FY 2023	FY 2024	FY 2025	Complete	Total Cost			
 EP5: Adv Armor-Piercing 	20.247	-	0.000	-	0.000	-	-	-	0.000					
(ADVAP) for Small Caliber Ammo														
• FL4: Small Caliber Ammo for Next Gen Squad Weapons	Ammo mo - 18.180 30.600 - 30.600 28.723 24.976 11.739 11.858 0.000 120 pons													

Remarks

These funding lines support EMD activities for the 7.62mm ADVAP ammunition and rapid prototyping/development of GP and SP ammunition for the NGSW systems. Other Program Funding in Budget Activity 05 (BA 05) PE 0604802A, Project EP5 ADVAP for Small Cal Ammo and BA 05 PE 0604802A Weapons and Munitions - Eng Dev Project FL4 Small Caliber Ammo for Next Gen Squad Weapons

D. Acquisition Strategy

New ammunition development effort for Next Generation Squad Weapons (NGSW) systems, will utilize the MTA authority for rapid prototyping/rapid fielding. 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.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Army	y								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 <i>Ammur</i>	ogram Ele 3639A / 7 hition	ement (N ank and	lumber/N Medium (ame) Caliber	Project EC2 I A Small C	: (Numbe dv Armor Cal Ammo	r /Name) -Piercing	(ADVAP)	for
Product Developmer	nt (\$ in M	illions)	ſ	FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
Projectile Development	Option/ CPFF	Northrop Grumman Innovation Systems : Independence, MO	-	1.046	Jan 2019	3.200	Jan 2020	-		-		-	Continuing	Continuing	Continuing
Ammo Cartridge Development 1	Option/ CPFF	Sig Sauer : Newington, NH	-	0.500		-		-		-		-	0.000	0.500	-
Ammo Cartridge Development 2	Option/ CPFF	General Dynamics : Florham Park, NJ	-	0.500		-		-		-		-	0.000	0.500	-
		Subtotal	-	2.046		3.200		-		-		-	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY	2021 CO	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)	MIPR	Picatinny Arsenal : New Jersey	6.387	1.680	Oct 2018	1.921	Oct 2019	-		-		-	Continuing	Continuing	Continuing
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	1.000	1.608	Oct 2018	1.000	Oct 2019	-		-		-	Continuing	Continuing	Continuing
		Subtotal	7.387	3.288		2.921		-		-		-	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ions)	ſ	FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	3.200	-		0.500	Oct 2019	-		-		-	Continuing	Continuing	Continuing
U.S. Army Aberdeen Test Center	TBD	Aberdeen : Maryland	-	-		0.200	Oct 2019	-		-		-	Continuing	Continuing	Continuing
		Subtotal	3.200	-		0.700		-		-		-	Continuing	Continuing	N/A
PE 0603639A: Tank ar	nd Mediur	n Caliber Ammuniti	on		UN		SIFIED			41500 44					111
Army						Page 37	ot 87		R	- 1 Line #	გვ				

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	hibit R-3, RDT&E Project Cost Analysis: PB 2021 Army													
Appropriation/Budget Activity 2040 / 4	R-1 Pro PE 060 <i>Ammun</i>	ogram El 3639A / 1 hition	ement (N Tank and I	umber/Na Medium C	a me) Caliber	Project (EC2 / Ad Small Ca	Number V Armor I Ammo	r/ Name) -Piercing	(ADVAP)	for				
	FY 2019	FY 2	2020	FY 2 Ba	2021 se	FY 20 OC)21 O	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract			
Project Cost Totals	Project Cost Totals 10.587 5.334						-		-	Continuing	Continuing	N/A		

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Date: Feb	oruary	2020						
Appropriation/Budget Activity 2040 / 4			R-1 Prog PE 0603 <i>Ammunit</i>	g ram Elemer 639A / Tank tion	nt (Number/Nam and Medium Cali	e) Project ber EC2 / Ac Small Ca	(Number/Na lv Armor-Pie al Ammo	me) rcing (ADVAP) for
	EY 2019	FY 20	20	EY 2021	FY 2022	EY 2023	EX 20	124	EY 2025
Event Name	1 2 3 4	1 2 3	4 1	2 3 4	1 2 3 4	1 2 3 4	1 2 3	3 4	1 2 3 4
NGSW Ammo Rapid Prototyping	NGSW Among PP								
NGSW Ammo Initital Product Review 1 (IPR 1) Special Purpose	NGSW Ammo IPR 1 S	3P							
NGSW Ammo Preliminary Design Review General Purpose (PD	R-GP)	o PDR-GP							
NGSW Ammo Initital Product Review 2 (IPR 2) Special Purpose	3 NGSW A	mmo IPR 2 SP							
NGSW Ammo Preliminary Design Review Special Purpose (PDI	R-SP)	A NGSW Amm	o PDR-SP						
NGSW Ammo Critical Design Review General Purpose (CDR-G	P)	5 NGSV		ЗP					
NGSW Ammo Prototype Test 1		N	GSW Ammo P	т1					
NGSW Ammo Initital Product Review 3 (IPR 3) Special Purpose				IPR 3 SP					
NGSW Ammo Full Materiel Release (FMR) Transitions from BA0	4 EC2 to BA05 FL4		NGSW	Ammo FMR BA04 te	o BA05 Transition				
NGSW Ammo Critical Design Review Special Purpose (CDR-SF	0		,	RGSW Ammo CDR-	SP				
NGSW Ammo Prototype Test 2				NGSW Ammo P	12				
NGSW Ammo Safety Testing (SP)					NGSW Ammo Safet	y Testing SP			
NGSW Ammo Urgent Materiel Release General Purpose (UMR	GP)				NGSW	Ammo UMR GP			
					1	I			1

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A															Da	te: Fe	ebruar	y 20)20						
Appropriation/Budget Activity 2040 / 4							R-1 PE (<i>Amn</i>	Prog 0603 nunit	gram 639/ iion	Eler	nen nk a	t (Nu and M	i mb Iedii	er/N um (lame Calik	e) Der	Proj EC2 Sma	j ect (l 2 / Adv all Cal	Numl / Arm / Amr	ber/N nor-Pi no	l ame) iercing	ı (Al	DVAP) for	
Event Name		F١	2019		F	Y 20	20		FY	2021	1		FY	202	2		FY 20)23		FY	2024	Τ	FY	202	5
Event Name	1	2	3	4 1	2	2 3	4	1	2	3	4	1	2	3	4	1	2 3	3 4	1	2	3 4		1 2	3	4
NGSW Ammo Urgent Materiel Release Special Purpose (UMR S	iP)													N	10. GSW /	Ammo	UMR SP								
NGSW Ammo Rapid Fielding															N	3SW A	mmo RF								
NGSW Ammo Production Qualification Testing Special Purpose	(PQ	T SP)														NGS	W Ammo	PQT SP	,						
NGSW Ammo Full Materiel Release (FMR)																					mmo FM	R			
												<u> </u>				L			1			1			

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Febru	Jary 2020
Appropriation/Budget Activity R 040 / 4 Pi An An	-1 Program Element (Number E 0603639A <i>I Tank and Mediun</i> mmunition	/ Name) n Caliber	Project (Number/Nam EC2 I Adv Armor-Pierc Small Cal Ammo	e) ing (ADVAP) for
Sched	dule Details			
	Sta	rt	En	nd
Events	Quarter	Year	Quarter	Year
NGSW Ammo Rapid Prototyping	1	2019	2	2024
NGSW Ammo Initital 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 Initital Product Review 2 (IPR 2) Special Purpose	4	2019	4	2019
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 Initital Product Review 3 (IPR 3) Special Purpose	4	2020	4	2020
NGSW Ammo Full Materiel Release (FMR) Transitions from BA04 EC2 to BA	05 FL4 2	2021	2	2021
NGSW Ammo Critical Design Review Special Purpose (CDR-SP)	2	2021	2	2021

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

<u>Note</u>

Note: Next Generation Squad Weapon (NGSW)

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4						am Elemen t 89A / Tank a n	t (Number/ nd Medium	Project (Number/Name) EC3 / Ammunition 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
EC3: Ammunition Logistics Prototyping	-	1.271	1.525	1.713	-	1.713	2.168	1.798	1.834	1.870	0.000	12.179
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This 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. Fiscal Year (FY) 2021 funding will be used to reduce device cost and establish an alternate source for monitoring devices as well as verifying that issues found during testing have been resolved. FY 2021 funding will also be used to demonstrate a suite of monitoring technologies, which will be used for assessing munitions reliability. 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
Title: Munitions Health and Inventory Monitoring Systems	1.271	0.991	1.213
Description: Performance and reliability of certain munitions can be degraded by the environmental exposure history they experience during their lifetime. This Project will develop simple to complex environmental health and inventory monitoring systems to improve reliability and asset visibility and enable effective Condition Based Management for Ammunition.			
<i>FY 2020 Plans:</i> Conducted an extended operational demonstration of the environmental health monitoring system to enable condition based management of ammunition. Continued verification testing of a type II prototype next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities for the assessment of munition reliability and completed an operational demonstration of the type I prototype. Completed operational demonstration of the low cost thermal indicator, which provides passive lifetime temperature exposure sensing.			
FY 2021 Plans: Conduct verification testing of a type II prototype next generation temperature/humidity sensor. Conduct verification testing of alternative form factor munitions health monitoring system on multiple packaging types. Conduct an assessment on the value of storing data in various formats from data rich to highly summarized to support a business case analysis of the transfer and long			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020	1
Appropriation/Budget Activity 2040 / 4	roject (Number/Name) C3 / Ammunition Logistics Prototyping			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
term storage of data in an overarching data system. Conduct envir prototypes.	onmental testing on phase 2 health monitoring suite (RRAP	DS)		
FY 2020 to FY 2021 Increase/Decrease Statement: Slight increase in labor costs.				
Title: Munitions Containerization Systems		-	0.465	0.500
Description: For each family of munitions containers, optimize protocombat unit load quantity, sustainability/recyclability, Insensitive Mureconfiguration, unitization, and standardized interfaces. This will in environmental and operational impacts.	totype container systems for automation compatibility, initions/explosives safety, environmental protection, load mprove ammunition distribution efficiency while minimizing			
FY 2020 Plans: Performed qualification testing of production representative rectang ammunition. Performed advanced development and prototype dem operating environment.	ular polymer container for family of 5.56 millimeter (mm) nonstration of the plastic cylindrical container in a realistic			
FY 2021 Plans: Conduct test and evaluation on injection molded cylindrical contained	er for integration with 105mm tank ammunition.			
FY 2020 to FY 2021 Increase/Decrease Statement: The slight increase from FY 2020 to FY 2021 is due to labor rate inc	creases.			
Title: FY 2020 SBIR/STTR Transfer		-	0.069	-
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 Subto	tals 1.271	1.525	1.713
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>				

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>LTank and Medium Caliber</i>	Project (N EC3 / Amn	umber/Name) nunition Logistics Prototyping
	Ammunition		

D. Acquisition Strategy

Munitions Health Monitoring and Munitions Containerization systems will be developed through government and industry prototype efforts. FY 2021 funding will be used to reduce device cost and establish an alternate source for monitoring devices as well as verifying that issues found during testing have been resolved.

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4							ogram Ele 3639A / 7 hition	ement (N Tank and	l umber/N Medium (ame) Caliber	Project (Number/Name) EC3 / Ammunition Logistics Prototyping				
Management Services (\$ in Millions)				FY 2	2019	FY 2020		FY 2021 Base		FY 2	2021 FY 202 CO 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	-	-		0.069		-		-		-	0.000	0.069	-
		Subtotal	-	-		0.069		-		-		-	0.000	0.069	N/A
Product Development (\$ in Millions)			FY	EY 2019 EV 2020		2020	FY 2021 Base		FY 2021		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
Next Generation Temperature Humidity Indicator	C/FFP	AGM : Tuscon, AZ	0.406	0.472	Aug 2019	0.387	Dec 2019	0.450	Mar 2021	-		0.450	0.000	1.715	-
Contract - Low Cost Thermal Indicator	C/FFP	Innosense : Torrance, CA	2.139	0.392	Aug 2019	0.186	Dec 2019	-		-		-	0.000	2.717	-
Contract - Remote Readiness Asset Prognostic/Diagnostic System (RRAPDS)	C/FFP	Karagozian & Case : Glendale, CA	1.152	-		-		0.450	Jun 2021	-		0.450	0.000	1.602	-
Contract-Plastic Cylindrical Container	C/FFP	SAVIT : Rockaway, NJ	0.647	-		0.261	Mar 2020	0.200	Mar 2021	-		0.200	0.000	1.108	-
Contract-Plastic Rectangular Container	C/FFP	Polymer Technologies Inc. : Clifton, NJ	-	-		-		0.200	Mar 2021	-		0.200	0.000	0.200	-
		Subtotal	4.344	0.864		0.834		1.300		-		1.300	0.000	7.342	N/A
Support (\$ in Millions)		ſ	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		021 FY 2021 O 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)	MIPR	Picatinny Arsenal : NJ	3.593	0.407	Dec 2018	0.386	Dec 2019	0.213	Dec 2020	-		0.213	0.000	4.599	-

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition					Project (Number/Name) EC3 <i>I Ammunition Logistics Prototyping</i>				
Support (\$ in Millions)			ſ	FY 2019		FY 2020		FY 2021 Base		FY	2021 FY 202 ⁴ CO 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 3.593			3.593	0.407		0.386		0.213		-		0.213	0.000	4.599	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
Yuma Proving Ground	MIPR	Yuma : AZ	0.086	-		-		-		-		-	0.000	0.086	-
Test and Evaluation	MIPR	TBD : TBD	0.150	-		0.236	Mar 2020	0.200	Mar 2021	-		0.200	0.000	0.586	-
		Subtotal	0.236	-		0.236		0.200		-		0.200	0.000	0.672	N/A
		Desired Cont Table	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY O	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	8.173	1.2/1		1.525		1.713		-		1./13	0.000	12.682	N/A

Remarks
Appropriation/Budget Activity Pr-1 Program Element (Number/Name) Project (Number/Name) 2040 / 4 PE 0603639A / Tank and Medium Caliber Project (Number/Name) EVent Name FY 2019 FY 2020 FY 2021 FY 2023 FY 2024 FY 2024 Advanced Concept Development-Munitions Health Monitoring- Advanced Concept Development-Munitions Containertation-14 Resource Readman Containertation-14 Resource Readman Containertation-14 Advanced Concept Development-Munitions Health Monitoring- Advanced Concept Development-Munitions Containertation-14 Readman Containertation-14 Readman Containertation-14 Advanced Concept Development-Munitions Health Monitoring- Advanced Concept Development-Munitions Containertation-14 Readman Containertation-14 Readman Containertation-14 Advanced Concept Development-Munitions Health Monitoring- Advanced Concept Development-Munitions Containertation-14 Readman Containertation-14 Readman Containertation-14 Advanced Concept Development-Munitions Centainertation-14 Readman Containertation-14 Readman Containertation-14 Readman Containertation-14 Readman Containertation-14 Advanced Concept Development-Munitions Health Monitoring- Readman Containertation-14 Readman Containertation-14 Readman Containertation-14 Red Development-Munitions Health Monitoring-	Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Army										Date	e: Febru	Jary	2020		
Event Name FY 2019 FY 2021 FY 2022 FY 2023 FY 2024 FY 2024 <th>Appropriation/Budget Activity 2040 / 4</th> <th></th> <th></th> <th>F A</th> <th colspan="7">R-1 Program Element (Number/Name)Project (IPE 0603639A / Tank and Medium CaliberEC3 / AmAmmunitionAmmunition</th> <th>lumb muniti</th> <th>er/Nam ion Logi</th> <th>e) istics</th> <th>s Protc</th> <th>otypin</th> <th>ng</th>	Appropriation/Budget Activity 2040 / 4			F A	R-1 Program Element (Number/Name)Project (IPE 0603639A / Tank and Medium CaliberEC3 / AmAmmunitionAmmunition							lumb muniti	er/Nam ion Logi	e) istics	s Protc	otypin	ng
Event Name 1 2 3 4 1		FY 201	•	FY 202	0	FY 20)21	F	Y 2022	F	FY 2023		FY 202	4	F	Y 20	025
Advanced Concept Development-Munitions Health Monitorino- Advanced Concept Development-Munitions Health Monitorino- Advanced Concept Development-Munitions Containerization-1 Advanced Concept Development-Munitions Containerization-1 Advanced Concept Development-Munitions Health Monitorino- Advanced Concept Development-Munitions Containerization-1 Advanced Concept Development-Munitions Health Monitorino- Advanced Concept Development-Munitions H	Event Name	1 2 3	4 1	2 3	4 1	2 3	3 4	1 2	3 4	1	2 3 4	1	2 3	4	1	2 3	3 4
Advanced Concept Development-Munitions Health Monitoring- Advanced Concept Development-Munitions Containerization- Advanced Concept Development-Munitions Health Monitoring- Tempers functification Practic Cylindrical Containeri- Advanced Concept Development-Munitions Health Monitoring- Advanced Concept Development-Munitions Health Monitoring- Advanced Concept Development-Munitions Health Monitoring- Tempers functification Practic Risettangular Containeri- Advanced Concept Development-Munitions Health Monitoring- Advanced Concept Development-Munitions Health Monit	Advanced Concept Development-Munitions Health Monitoring-	Remote Readiness	Asset Progr	nostic/Diagnos	tic System	(RRAPDS)-F	hase 1										
Advanced Concept Development-Munitions Health Monitoring-Concept Development-Munitions Containerization-1 Advanced Concept Development-Munitions Containerization-1 Advanced Concept Development-Munitions Containerization-1 Advanced Concept Development-Munitions Health Monitoring-Containerization-Plastic Reitsingular Containerization-Plastic Reitsingular Containerization	Advanced Concept Development-Munitions Health Monitoring-	A															
Advanced Concept Development-Munitions Containerization-1A Advanced Concept Development-Munitions Containerization-1A Advanced Concept Development-Munitions Health Monitoring: Rest Generation Temper Start/Humdity Sensor	Advanced Concert Development Musikers Lies Mr. Maritarian				Rem	ote Readine	ess Asset	Prognostic	/Diagnostic Sys	tem (RR/	APDS)-Phase 2						
Advanced Concept Development-Munitions Containerization-1 Advanced Concept Development-Munitions Containerization-Plastic Opindical Container Advanced Concept Development-Munitions Health Monitoring- Munitions Containerization-Plastic Rectangular Container Munitions Containerization Plastic Rectangula	Advanced Concept Development-Munitions Health Monitoring-2	Low Cost Thermal I	ndicator														
Advanced Concept Development-Munitions Containerization-1A Advanced Concept Development-Munitions Health Monitoring-5 Nata Generation Temper Unreffunding Sensor	Advanced Concept Development-Munitions Containerization-1		Munit	tions Containe	rization-Pla	stic Cylindrid	al Contai	ner									
Advanced Concept Development-Munitions Health Monitoring-	Advanced Concept Development-Munitions Containerization-1/	a	Munit	tions Containe	rization-Pla	stic Rectan	ular Con	ainer									
Next Generation Temperature/Humidity Sensor	Advanced Concept Development-Munitions Health Monitoring-3																
		Next Generation Te	mpersture/H	Humidity Sense	or												

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army	Date: February 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition	Project (N EC3 / Amr	umber/Name) nunition Logistics Prototyping

Schedule Details

	St	art	End		
Events	Quarter	Year	Quarter	Year	
Advanced Concept Development-Munitions Health Monitoring-1	2	2015	4	2020	
Advanced Concept Development-Munitions Health Monitoring-1A	1	2021	4	2023	
Advanced Concept Development-Munitions Health Monitoring-2	2	2015	4	2022	
Advanced Concept Development-Munitions Containerization-1	1	2020	4	2021	
Advanced Concept Development-Munitions Containerization-1A	1	2020	4	2021	
Advanced Concept Development-Munitions Health Monitoring-3	3	2017	4	2023	

	suncation:	PB 2021 A	vrmy							Date: Fe	bruary 2020			
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name)Project (Number/Name)PE 0603639A I Tank and Medium CaliberEL7 I Reduced Range AmmunitionAmmunitionAmmunition									
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 202	4 FY 2025	Cost To Complete	Total Cost		
EL7: Reduced Range Ammunition	-	2.090	0.000	0.000	-	0.000	0.000	0.000	0.0	00 0.00	0 0.000	2.090		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-						
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. There is no funding requested in Fiscal Year (FY) 2021.														
B. Accomplishments/Planned P	rograms (\$	in Millions	<u>s)</u>							FY 2019	FY 2020	FY 2021		
Title: Technology Maturation and	Risk Reduc	tion (TMRF	२)							2.090	-	-		
Description: Develop, demonstrate, and qualify small caliber 7.62mm and .50 caliber ammunition that will provide a reduced range training capability to the M240 and M2 guppers														
range training capability to the M2		gannere												
range training capability to the M2					Accomplis	shments/PI	anned Prog	grams Subt	otals	2.090	-	-		
C. Other Program Funding Sum	mary (\$ in I	<u>Villions)</u>			Accomplis	shments/Pl	anned Proថູ	grams Subt	otals	2.090	-	-		

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020	
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
204074	Ammunition	ELTIREOL	iced Range Ammunition

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.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Ammui	ogram Ele 3639A / 7 hition	ement (N Fank and	umber/N Medium (ame) Caliber	Project EL7 / R	: (Numbe educed R	r/ Name) Range Amr	munition	
Product Developmer	nt (\$ in M	illions)	ſ	FY	2019	FY	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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	C/CPFF	General Dynamics : Florham Park, NJ	-	0.770	Jan 2019	-		-		-		-	0.000	0.770	-
Development Contract # 2	C/CPFF	Nammo Tally : Mesa, AZ	-	0.770	Jan 2019	-		-		-		-	0.000	0.770	-
		Subtotal	-	1.540		-		-		-		-	0.000	1.540	N/A
Support (\$ in Million	s)		ſ	FY	2019	FY	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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)	MIPR	Picatinny Arsenal : New Jersey	3.133	0.550	Oct 2018	-		-		-		-	0.000	3.683	-
Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	0.430	-		-		-		-		-	0.000	0.430	-
		Subtotal	3.563	0.550		-		-		-		-	0.000	4.113	N/A
Test and Evaluation	(\$ in Milli	ons)	ſ	FY	2019	FY	2020	FY 2 Ba	2021 Ise	FY	2021 CO	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
US Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	0.327	-		-		-		-		-	0.000	0.327	-
Prototype testing	C/FFP	Double B Enterprises : Malvern, OH	0.052	-		-		-		-		-	0.000	0.052	-
		Subtotal	0.379	-		-		-		-		-	0.000	0.379	N/A
PE 0603639A: Tank ar	nd Mediur	n Caliber Ammuniti	on		UN	ICLAS	SIFIED								125

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	ý							Date:	Date: February 2020					
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name)Project (IPE 0603639A / Tank and Medium CaliberEL7 / RecAmmunitionAmmunition							umber/Name) uced Range Ammunition			
Prior Years FY 2019			FY 2	:020	FY 2 Ba	2021 se	FY 2 OC	021 O	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
Project Cost Totals 3.942 2.090					-		-		-	0.000	6.032	N/A		

Remarks



Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy						Date: February 2020				
Appropriation/Budget Activity 2040 / 4			R-1 Pr PE 060 <i>Ammu</i>	ogram Elemen D3639A / Tank a nition	t (Number/Name and Medium Calib	er EL7 /	roject (Number/Name) _7 I Reduced Range Ammunition				
-	FY 2019	FY 20	20	FY 2021	FY 2022	FY 202	23	FY 2024	FY 2025		
Event Name	1 2 3 4	1 2 3	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 Caliber I	EMD								
.50 Caliber Preliminary Design Review (PDR)			6 .50 Calibe	r PDR							
.50 Caliber Pre-Production Qualification Test (PPQT)			.50	Caliber PPQT							
.50 Caliber Soldier Touch Point (STP)				.50 Caliber STF	Þ						
.50 Caliber Critical Design Review (CDR)				.50 Cali	per CDR						
.50 Caliber Production Qualification Test (PQT)					.50 Caliber PQT						
.50 Caliber Milestone C (MS C)						.50 Caliber	MS C				

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army	Date: Feb	Date: February 2020						
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0603639A Ammunition	Element (Number I Tank and Mediu	e r/Name) ım Caliber	r/Name) Project (Number/Name) m Caliber EL7 I Reduced Range Ammunition				
S	Schedule Detail	S						
		S	tart	E	ind			
Events		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	4	2020			
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			

Exł	nibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Feb	ruary 2020				
Ap 204	propriation/Budget Activity 0 / 4	R-1 Program PE 0603639A <i>Ammunition</i>	Element (Numbe I Tank and Mediu	r/Name) m Caliber	Project (Number/Name) EL7 / Reduced Range Ammunition				
			Sta	art		E	nd		
	Events		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		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	am Elemen 39A I Tank a n	t (Number/ and Medium	lumber/Name) Caliber All-Purpose Tactical (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
EU3: .50 Caliber All-Purpose Tactical Cartridge (APTC)	-	0.000	4.250	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.250
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note												

In Fiscal Year (FY) 2021, the small caliber All-Purpose Tactical Cartridge (APTC) Project transitions to Budget Activity 05 (BA 05) Program Element (PE) 0604802A, Project EU5, .50 Caliber All-Purpose Tactical Cartridge (APTC) to continue development work and support Engineering and Manufacturing Development (EMD).

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 APTC is to deliver a single round that replaces and improves current legacy .50 caliber ammunition. The APTC will be compatible with all Army .50 caliber weapons but specifically optimized to work in the M2 Machine Guns. There is no FY 2021 funding request.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Technology Maturation and Risk Reduction (TMRR)	-	4.057	-
Description: Develop, demonstrate, and qualify new .50 Caliber ammunition to replace and/or improve current legacy .50 Caliber variants.			
FY 2020 Plans: Built, evaluated, and refined .50 Caliber APTC concepts/prototypes and performed Milestone B preparation activities. Evaluated M8 Armor Piercing Incendiary (API), M20 API Trace, M903 Saboted Light Armor Penetrator (SLAP), and M962 SLAP Trace ammunition for improvements that would satisfy the .50 APTC requirement.			
FY 2020 to FY 2021 Increase/Decrease Statement: The effort under Budget Activity 04, Program Element (PE) 0603639A, Project EU3, .50 Caliber APTC, transitions in FY 2021 to Budget Activity 05, PE 0604802A, Project EU5.			
Title: FY 2020 SBIR/STTR Transfer	-	0.193	-
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:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army									Date: February 2020				
Appropriation/Budget Activity 2040 / 4				R-1 Pi PE 06 <i>Ammu</i>	ogram Eler 03639A / Ta nition	nent (Numb nk and Medi	er/Name) um Caliber	Proje EU3 / Cartrie	ctical				
B. Accomplishments/Planned Pro	grams (\$ in I	<u> Millions)</u>						[FY 2019	FY 2020	FY 2021		
Funding transferred in accordance w	vith Title 15 U	SC ?638											
				Accon	nplishment	s/Planned P	rograms Sul	btotals	-	4.250	-		
C. Other Program Funding Summa	ary (\$ in Milli	ons)											
		-	<u>FY 2021</u>	FY 2021	FY 2021					<u>Cost To</u>			
Line Item	<u>FY 2019</u>	<u>FY 2020</u>	Base	000	<u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 202</u>	24 <u>FY 202</u>	5 <u>Complete</u>	Total Cost		
• EU5: .50 Caliber All-Purpose Tactical cartridge (APTC)	-	-	8.491	-	8.491	9.390	-		- 11.98	9 0.000	29.870		
Remarks													
Project EU3 A.50 Caliber APTC fun (APTC).	ding transitior	ned to BA 5	PE 0604802	A Weapons	and Munitio	ns - Eng Dev	, Project EU	5, .50 Ca	aliber All-Purp	ose Tactical	Cartridge		

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.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 20	21 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Pro PE 060 Ammun	ogram Ele 3639A / T hition	ement (N ank and	lumber/N Medium (ame) Caliber	Project EU3 / . Cartridg	(Numbe 50 Caliber ge (APTC	r/Name) ⁻ All-Purpo)	ose Tactic	al
Management Service	es (\$ in M	illions)		FY	2019	FY 2	2020	FY : Ba	2021 ase	FY	2021 CO	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	-	-		0.193		-		-		-	0.000	0.193	-
		Subtotal	-	-		0.193		-		-		-	0.000	0.193	N/A
Product Developmen	nt (\$ in Mi	illions)		FY	2019	FY 2	2020	FY : Ba	2021 ase	FY 2	2021 CO	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 Development	C/CPFF	To be Determined : To be Determined	-	-		2.435	Jan 2020	-		-		-	Continuing	Continuing	Continuing
		Subtotal	-	-		2.435		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions	s)			FY	2019	FY 2	2020	FY : Ba	2021 ase	FY : O	2021 CO	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)	MIPR	Picatinny Arsenal : New Jersey	-	-		0.936	Jan 2020					-	Continuing	Continuing	Continuing
		Subtotal	-	-		0.936		-		-		-	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ons)		FY	2019	FY 2	2020	FY : Ba	2021 ase	FY 2	2021 CO	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
Verification Testing	MIPR	Army Research Lab (ARL) : Maryland	-	-		0.686	Jan 2020	-		-		-	Continuing	Continuing	Continuing
		Subtotal	-	-		0.686		-		-		-	Continuing	Continuing	N/A
PE 0603639A: <i>Tank an</i>	nd Mediur	n Caliber Ammunitio	n		U		SIFIED								122

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	bit R-3, RDT&E Project Cost Analysis: PB 2021 Army								Date: February 2020						
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>						Project (Number/Name) EU3 I .50 Caliber All-Purpose Tactical Cartridge (APTC)				
	Prior Years	FY2	2019	FY 2	020	FY 2 Ba	2021 Ise	FY 2 OC	021 :O	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
Project Cost Totals	-	-		4.250		-		-		-	Continuing	Continuing	N/A		

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	٩rmy																	Da	te: F	ebr	uary	20	20		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber AmmunitionProject (N EU3 / .50 								Number/Name) Caliber All-Purpose Tactical (APTC)												
		FY	2019		F	Y 20:	20		FY	2021		F	Y 202	2		FY 202	3		FY	202	24		F	Y 20	25
Event Name	1	2	3 4	1	2	3	4	1	2	3 4	1	1 2	2 3	4	1	2 3	4	1	2	3	4	1	2	3	4
APTC Materiel Development Decision (MDD)			,		MDD																				
APTC Concept & Prototype Development					АРТС	Conce	ept & Pro	totype	Devel	opment															
APTC Design Verification Test (DVT) 1					A		VT 1																		
APTC Preliminary Design Review (PDR)							APT		ર																
APTC Milestone B								APT	C MS E	3															
APTC Transitions from BA04 EU3 to BA05 EU5							A	<mark>4</mark> РТС В/	A04 to	BA05 Tran:	sition	I													
APTC Engineering & Manufacturing Development (EMD)									APTC	EMD															
APTC Design Verification Test (DVT) 2									APT	C DVT 2															
APTC Pre-Production Qualification Testing (PPQT)										APT	CPP	ат													
APTC Critical Design Review (CDR)												AP													
APTC Production Qualification Testing (PQT)													APTC	PQT											
APTC Milestone C (MS C)														A.F	6 •тс м	sc									

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				D	ate: Febru	uary 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0603639A Ammunition	Element (Numbo I Tank and Medio	e r/Name) ım Caliber	Project (Nun EU3 / .50 Cal Cartridge (AF	nber/Nam liber All-Po PTC)	e) urpose Tactical
	Schedule Detail	S				
		S	tart		Er	d
Events		Quarter	Year	Qua	arter	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

<u>Note</u>

Note: All-Purpose Tactical Cartridge (APTC)

Exhibit R-2A, RDT&E Project Ju	hibit R-2A, RDT&E Project Justification: PB 2021 Army									Date: Febr	uary 2020			
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	am Elemen 89A / Tank a n	t (Number/ and Medium	Name) Caliber	Project (N FA5 / Assu Munitions	oject (Number/Name) 5 I Assured Precision Weapons and unitions				
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		
FA5: Assured Precision Weapons and Munitions	-	13.797	31.267	29.878	-	29.878	30.971	30.971	24.977	12.133	Continuing	Continuing		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				

A. Mission Description and Budget Item Justification

The Assured Precision Weapons and Munitions (APWM) - FA5 Project is focused on advanced risk mitigation, technology integration, prototyping, and product support to identify, evaluate, mature, test, and demonstrate various assured precision prototype technologies in weapon and munitions components and subsystems within a complex system of systems environment. The APWM Project reinforces the National Defense Strategy's major lines of effort through technology development and prototyping, which increases lethality and ensures future combat overmatch success of the Joint Force against peer/near-peer adversaries. This project also aims to improve program performance and affordability for multiple weapons and munitions Programs of Record (PoRs) via Joint Lethality Positioning, Navigation and Timing (PNT) and Army M-Code Global Positioning System (GPS) coordinated efforts. The APWM Project directly supports top Army Modernization Priorities via the Assured-PNT (A-PNT) and Long Range Precision Fires (LRPF) Cross Functional Team (CFT) imperatives in support of the National Defense Strategy. Funding will support engagement by Weapons and Munitions PNT experts in the development, evaluation, and technology delivery activities of the Air Force's M-Code GPS, Army's PNT related programs, and A-PNT CFT programs in support of LRPF and Counter Area Access/Area Denial missions. Funding will also enable component and subsystem architecture input essential for precision weapons and munitions operating in a NavWar system-of-systems environment, Army M-Code GPS technology integration and evaluation, planning for next generation M-Code GPS integration into the Long Range Precision Guidance Kit (LR-PGK) as the Department of Defense-selected representative Joint precision munition, and maturation of alternative PNT related technologies and solutions to enable informed A-PNT related PoR milestone and Army cross-functional modernization decisions.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<i>Title:</i> APWM Integrated Product Support - Joint Lethality PNT SME Working Integrated Product Team (WIPT) & Program Management	2.255	3.397	3.616
Description: Provide assured precision weapons and munitions technical subject matter expertise and support to the Joint oversight board for assured precision weapons and munitions. Provide overall APWM Project Program Management support.			
FY 2020 Plans: The subject matter experts continued to coordinate with and supported the development and technology delivery activities of the Air Force?s Military GPS User Equipment (MGUE) program and the Army?s A-PNT program including participation in design reviews, evaluation and formal feedback on technology and systems requirements and performance, component and subsystem architecture input essential for precision weapons and munitions operating in a system-of-systems environment, and configuration			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020			
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition	Project (N FA5 / Assu Munitions	Dject (Number/Name) 5 I Assured Precision Weapons and Initions				
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2019	FY 2020	FY 2021		
management of the evolving Joint Common GPS Specification and Interface C (PGMs). Specific support focus included requirements for MGUE Increment 2 a	control Document for Precision Guided Munition and alternative PNT technology maturity.	าร					
FY 2021 Plans: The subject matter experts will continue coordinating with and supporting the d the A-PNT CFT, Air Force?s MGUE program and the Army?s PNT related prog evaluation and formal feedback on technology and systems requirements and architecture input essential for precision weapons and munitions operating in a management of the evolving Joint Common GPS Specification and Interface O includes requirements for MGUE Increment 2 and alternative PNT technology	levelopment and technology delivery activities grams including participation in design reviews performance, component and subsystem system-of-systems environment, and configur control Document for PGMs. Specific support for maturity.	of ation ocus					
FY 2020 to FY 2021 Increase/Decrease Statement: Level of effort required in Fiscal Year (FY) 2021 is slightly higher than FY 2020 program efforts maturing and impacting collaborative efforts for the Joint Letha	due to A-PNT CFT and Air Force?s MGUE lity community.						
Title: Assured PNT related Integration Risk Mitigation - A-PNT for Family of So	catterable Mines (FASCAM) Replacement		0.767	1.904	-		
Description: Evaluate, mature and test A-PNT system/subsystem components	s for terrain shaping enabling technologies.						
FY 2020 Plans: Down-select assured precision technologies including A-PNT technologies for capabilities through modeling and simulation based verification to initiate corre	future terrain shaping PoR communication sponding technology demonstrations.						
FY 2020 to FY 2021 Increase/Decrease Statement: Modeling and Simulation, Prototyping, and proof of concept evaluations of A-P conclude in FY 2020. Evaluation and design reports will support transition of a significantly reducing integration risk.	NT technologies supporting terrain shaping Po A-PNT technologies to the terrain shaping PoR	R					
Title: Assured PNT related Integration Risk Mitigation - Network Assisted A-PN	IT (NA2) for Weapons & Munitions Phase 1		6.300	-	-		
Description: Evaluate, mature and demonstrate technologies for modifying Ne data exchange that support Alternative PNT and M-Code for Weapons and Mu	etwork Assisted GPS (NA GPS) and associated initions.	Ł					
Title: Assured PNT related Integration Risk Mitigation - NA2 for Weapons and	Munitions Phase 2		-	5.494	3.700		
Description: Perform NA2 systems of systems capability integration and press activities. Improve initial prototype NA2 capability and initiate improved prototype Inform future NAVWAR related weapons and munitions platform dependencies	ystem qualification integration risk reduction pe for subsequent transition to corresponding f s. Integrate and synchronize AltNav capability	PoRs.					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: Fe							
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	me) Project (Number/Name) aliber FA5 I Assured Precision Weapons and Munitions					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021			
delivery within NA2 to meet A-PNT CFT AltNav Directed Requirement whic operational capability in two Brigade Combat Teams NLT 1QFY24.	ch summarizes the urgent need for AltNav initial						
FY 2020 Plans: Included down-selected alternative Positioning, Navigation and Timing (PN PNT phase 1 prototype into improved phase 2 Network Assisted Assured-Network Assisted Assured-PNT systems of systems capability integration a activities and finalize prototype software solutions.	IT) technologies from initial Network Assisted Ass PNT system of system prototype solution. Perform and pre-system qualification integration risk reduc	ured- ned tion					
FY 2021 Plans: Perform Assured PNT system-of-systems integration risk reduction activitie Conduct full system of systems integration test event for NA2 to mitigate ris Programs of Record to meet A-PNT CFT AltNav Directed Requirement for	es. Refine NA2 sub-system prototype software. sk of transitioning NA2 capability to the field via m Initial Operational Capability in FY 2024.	ultiple					
FY 2020 to FY 2021 Increase/Decrease Statement: Majority of sub-system prototype software will be completed in FY 2020. F based on FY 2020 integration risk reduction activities and conducting a full which requires less effort than FY 2020 activities.	Y 2021 focuses on refining prototype software sol I system-of-systems integration developmental tes	utions st					
Title: Assured PNT related Integration Risk Mitigation - NA2 for Guided Ro	ocket/Missile Launcher Systems	-	2.823	2.000			
Description: Perform software development and prototyping activities to d launcher systems. Integrate and demonstrate upgraded artillery launcher s capability to reduce subsequent PoR fielding risks. Integrate and synchron PNT CFT AltNav Directed Requirements which summarizes the urgent new Combat Teams NLT 1QFY24.	lemonstrate NA2 capability for Rocket/Missile artil system into the NA2 systems of systems networke ize AltNav capability delivery within NA2 to meet <i>i</i> ed for AltNav initial operational capability in two Br	lery d A- igade					
FY 2020 Plans: Conducted requirements refinement activities and initiated software develor Network Assisted Assured-PNT (NA2) capability for Rocket/Missile artillery activities for Rocket/Missile artillery launcher systems.	opment and prototyping activities to provide initial / launcher systems. Initiated prototyping risk mitig	ation					
FY 2021 Plans: Perform Assured PNT Rocket/Missile system-of-systems integration risk relauncher NA2 prototype software. Conduct full system-of-systems integration	eduction activities. Refine Rocket/Missile artillery on developmental test event utilizing Rocket/Miss	ile					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: F	ebruary 2020)	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (Number/I FA5 / Assured Pre Munitions	Name) cision Weapo	ns and
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
artillery launchers for NA2 to mitigate risk of transitioning NA2 capability to the Requirement for Initial Operational Capability in FY 2024.	e field to meet A-PNT CFT AltNav Directed			
FY 2020 to FY 2021 Increase/Decrease Statement: Majority of Rocket/Missile artillery launcher software will be completed in FY 2 integration activities which requires less effort than FY 2020 activities.	2020. FY 2021 focuses primarily on risk reductio	1		
Title: Assured PNT related Weapons & Munitions Prototyping - A-PNT upgra	des for PGM Fuze Setter	2.137	-	-
Description: Develop, prototype, and evaluate required emerging A-PNT tec needed to enable continued performance of PGMs) in a realistic operational t	hnology enhancements to the PGM Fuze Setter hreat environment.			
Title: Assured PNT related Weapons & Munitions Prototyping - A-PNT upgra	des for Towed Howitzer Platforms	0.472	-	-
Description: Prototype and evaluate MGUE Increment 1 (M-code) GPS rece Howitzer Platforms and evaluate technologies for providing Assured PNT to F	iver cards in the M777A2 and M119A3 Towed PGMs.			
Title: Assured PNT related Weapons & Munitions Prototyping - Alternative Na	avigation Technologies (AltNav) Phase 1	1.866	-	-
Description: Develop, prototype, and evaluate non-Global Positioning System prototype systems for indirect fires, including Long Range Precision Fires.	m Radio Frequency (Non-GPS RF) Navigation			
Title: Assured PNT related Weapons & Munitions Prototyping - AltNav Techn	ologies (AltNav) Phase 2	-	4.962	3.175
Description: Conduct rapid development and prototyping of AltNav receivers operational feedback (receivers, enterprise service, and integration) of solution intent of the A-PNT CFT AltNav Directed Requirement. Demonstrate and con and software solutions to support Artillery integration efforts as well as inform Land Combat domain.	for precision guided munitions (PGMs) and ass ns to maximize utility of AltNav for LRPF meeting duct performance assessments of potential hard future Space-based PNT related alternatives for	ess the ware the		
FY 2020 Plans: Designed and developed an Alternative Navigation (AltNav) capable hardwar Munition (PGM) applications to demonstrate and quantify AltNav performance and software prototype to conduct a ride-along performance evaluation of Alt	e and software prototype for Precision Guided e. Performed integration efforts with the hardward Nav in a PGM environment.	•		
FY 2021 Plans:				

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army							
R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Projec FA5 I A Munitic	Project (Number/Name) A5 I Assured Precision Weapons and Munitions					
	Γ	FY 2019	FY 2020	FY 2021			
-hit PGM experiments. Generate AltNav f the A-PNT CFT AltNav Directed Requireme	nt.						
21 will focus on completing integration activitie t than FY 2020 activities.	es and						
th Determinations System (LADS)		-	1.223	-			
an assured weapon survey capability within th	e						
tem (LADS) into the M777A2 and M119A3							
pleted in FY 2020. Technology transitions to							
		-	9.022	12.101			
port related to the development, prototyping, as all Army Weapons and Munitions, including anology, component-level, card-level, sub-sys and inform M-Code GPS related Army cross eer/near threat system-of-systems environme ely sufficient to enable Combat Overmatch.	tem- nt as						
Team (IPT). Initiated the definition, eds for Army Weapons and Munitions to influe , including low power and high performance c on and experimentation mechanism to assess es operating in a peer/near Positioning, Navig	nce ross- the ation						
	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i> -hit PGM experiments. Generate AltNav f the A-PNT CFT AltNav Directed Requirement 21 will focus on completing integration activities than FY 2020 activities. Th Determinations System (LADS) an assured weapon survey capability within the tem (LADS) into the M777A2 and M119A3 pleted in FY 2020. Technology transitions to port related to the development, prototyping, and inform M-Code GPS related Army cross- eer/near threat system-of-systems environment ely sufficient to enable Combat Overmatch.	R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition Project FA5 / A Munition Phit PGM experiments. Generate AltNav f the A-PNT CFT AltNav Directed Requirement. Image: Comparison of the compari	Date: F- R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition Project (Number/N FA5 / Assured Prec Munitions Project (Number/Name) FY 2019	Date: February 2020 R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition Project (Number/Name) FAS / Assured Precision Weapon Munitions			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020				
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project FA5 / As Munition	(Number/N sured Pred s	r/Name) recision Weapons and			
B. Accomplishments/Planned Programs (\$ in Millions)		F	TY 2019	FY 2020	FY 2021		
Lead an Army M-Code GPS Weapons and Munitions IPT and influence the Air established requirements and performance based needs for Army Weapons an prototyping, and experimentation mechanism to assess the effectiveness of M- capabilities operating in a peer/near PNT threat system-of-systems environmer analysis, and integration imperatives for the Army M-Code Task Force.	Force?s MGUE technology investments via ad Munitions. Lead a centralized Army evalua Code GPS focused weapon and munition plat at. Lead a multi-organizational IPT to execute	tion, form study,					
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 focuses on executing technology integration and migration strategies of participating in development of next generation M-Code technology which requ	developed in FY 2020; as well as, actively ires an increased level of effort.						
Title: MGUE Increment 2 (Inc2) with Precision Guidance Kit - Anti Jam (LR PG	К)		-	1.023	1.500		
Description: Influence next generation Military GPS User Equipment (MGUE) needs and requirements are met with the Air Force's next generation MGUE. In Long Range Precision Guidance Kit (LR-PGK) as the DoD-selected representation needs and requirements are met by next generation MGUE.	development to ensure precision guided muni ntegrate and test next generation MGUE into the tive Joint precision munition to verify and valid	tion he late					
<i>FY 2020 Plans:</i> Finalized next generation Precision Guided Munition (PGM) Military GPS User document for use by the MGUE program. Attended technical interchange mee designs to meet Precision Guided Munitions (PGM) needs and requirements for reduction analysis and activities of MGUE vendor designs.	Equipment (MGUE) technical requirements tings with MGUE vendors to influence MGUE or next generation performance. Performed risl	ĸ					
FY 2021 Plans: Perform modeling and simulations on GPS threat scenarios on MGUE designs Perform risk reduction analysis and activities of MGUE vendor designs. Draft In Circuit (ASIC) (NGA) Technology Maturity Assessment (TMA) & Integration Ris	to assess performance for PGM applications. ac2 Next Generation Application Specific Integ sk Analysis (IRA) Report for PGMs.	rated					
FY 2020 to FY 2021 Increase/Decrease Statement: GPS vendor designs will be more mature in FY 2021 and a more formalized teorisk analysis will be needed to track progress and assess future integration risk additional level of effort beyond FY 2020.	chnology maturity assessment and integration . A formalized process in FY 2021 will require	an					
Title: Fires System-of-Systems APNT related AS and Navigation Warfare (Nav	War)		-	-	3.786		
Description: Prototype PNT enabling technologies that are critical for executin include munition-based offensive, defensive, and associated command and correnabling combat lethality overmatch in PNT challenged environments for cannot	g Fires System-of-Systems NavWar missions ntrol (C2) functions. Prototyping efforts will foc on and rocket/missile core missions. Provide lo	to us on ong					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition	Project (N FA5 / Assu Munitions	umber/N ured Pred	lame) cision Weapor	ns and
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2019	FY 2020	FY 2021
range stand-off NavWar capability to penetrate contested Anti Access/Area De artillery, Fires systems-of-systems architectures enabling advanced NavWar a jam/anti-spoof techniques for munitions.	enial (A2/AD) environments via use of long-rang ttack, sense, and optimization, and advanced a	e nti-			
FY 2021 Plans: Prototype PNT enabling technologies that are critical to APNT and AS operation systems domain. Prototyping efforts will focus on enabling and or maintaining environments for cannon and rocket/missile applications. Design and develop can be demonstrated in a Live Fire Test from a 155mm artillery cargo round to informing emerging gun-launched NavWar CONOPs and capability requirements.	onal capabilities within the fires system-of- combat lethality overmatch in PNT challenged a gun-hardened NavWar system prototype that prove its capability in FY 2022. Technical repo nts.	ts			
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 focuses on prototyping PNT technologies to fill Precision Weapons an system-of-systems APNT and Anti-Spoof operational capabilities and enabling effort will take two years & utilizes previous system-of-systems efforts to further technologies.	nd Munitions NavWar gaps via enhancing fires munition-deployed NavWar payloads. This r refine and develop PNT and NavWar enabling	I			
Title: FY 2020 SBIR/STTR Transfer			-	1.419	-
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 Subt	otals	13.797	31.267	29.878
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					
D. Acquisition Strategy Acquisition Strategy: The Assured Precision Weapons and Munitions Project such as the Defense Ordinance Technology Consortium (DOTC) Section 845	will utilize a combination of Other Transaction OTA and In-House government development a	Authority (nd engine	OTA) cor ering cap	ntract mechan abilities to ob	iisms tain

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020							
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (Number/Name) FA5 I Assured Precision Weapons and Munitions						
prototypes and demonstrate/evaluate the maturity and integration risk c capabilities.	of the M-Code GPS on Precision Munitions and Wea	oons, as well as other alternative PNT related						

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	/ 2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (PE 0603639A / Tank and Medium CaliberFA5 / AssAmmunitionMunitions						(Number/Name) ssured Precision Weapons and as			
Management Service	es (\$ in M	illions)	ſ	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		21 FY 2021 D 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	-	-		1.419		-		-		-	0.000	1.419	-
		Subtotal	-	-		1.419		-		-		-	0.000	1.419	N/A
Product Development (\$ in Millions)		ſ	FY	2019	FY 2	2020	FY 2021 Base		FY 2	2021 CO	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
PGM MGUE AS Risk Reduction	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	7.785	-		-		-		-		-	0.000	7.785	-
Assured PNT related Weapons Integration Risk Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	3.265	3.585	Dec 2018	4.324	Dec 2019	4.400	Dec 2020	-		4.400	Continuing	Continuing	Continuing
Assured PNT related Weapons Integration Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD, Various : Various	2.000	2.000	Dec 2018	1.271	Dec 2019	1.000	Dec 2020	-		1.000	Continuing	Continuing	Continuing
Assured PNT related Munitions Integration Risk Mitigation	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	2.500	2.500	Dec 2018	4.571	Dec 2019	2.786	Dec 2020	-		2.786	Continuing	Continuing	Continuing
Assured PNT related Munitions Integration Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD,Various : Various	2.000	2.000	Dec 2018	4.611	Dec 2019	3.175	Dec 2020	-		3.175	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	/ 2020			
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (IPE 0603639A / Tank and Medium CaliberFA5 / AssAmmunitionMunitions								(Number/Name) sured Precision Weapons and s			
Product Developmer	nt (\$ in M	illions)		FY	2019	FY 2020		FY 2021 Base		FY	2021 CO	FY 2021 Total]				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract		
Army M-Code Technology Integration and Evaluation	MIPR	Various : Various	-	-		6.521	Dec 2019	7.101	Dec 2020	-		7.101	Continuing	Continuing	Continuing		
		Subtotal	17.550	10.085		21.298		18.462		-		18.462	Continuing	Continuing	N/A		
Support (\$ in Millions)			FY 2019		FY 2	2020	FY 2021 Base		FY 2	2021 CO	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	Various	Joint Program Executive Office Armaments and Ammunition (JPEO A&A) : Picatinny Arsenal, NJ	1.013	1.169	Dec 2018	1.140	Dec 2019	1.275	Dec 2020	-		1.275	Continuing	Continuing	Continuing		
Assured Precision Weapons and Munitions IPT Support	MIPR	Various : Various	2.861	1.086	Dec 2018	2.176	Dec 2019	2.341	Dec 2020	-		2.341	Continuing	Continuing	Continuing		
Assured Technologies Engineering Support	MIPR	Combat Capability Development Command Armament Center (CCDC AC) : Picatinny Arsenal, NJ	0.835	0.657	Dec 2018	1.071	Dec 2019	1.100	Dec 2020	-		1.100	Continuing	Continuing	Continuing		
Assured Technologies Engineering Support	MIPR	Communication Electronics Research,Developmer and Engineering Center (C5ISR) : Aberdeen Proving Ground, MD	nt –	0.800	Dec 2018	0.671	Dec 2019	0.200	Dec 2020	-		0.200	Continuing	Continuing	Continuing		
Army M-Code Technology Integration and Evaluation Support	MIPR	Various : Various	-	-		2.421	Dec 2019	3.500	Dec 2020	-		3.500	Continuing	Continuing	Continuing		
MGUE Inc 2 for LR-PGK Engineering Support	MIPR	Combat Capability Development	-	-		1.071	Dec 2019	1.500	Dec 2020	-		1.500	Continuing	Continuing	Continuing		

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (NumPE 0603639A / Tank and Medium CaliberFA5 / AssuredAmmunitionMunitions						r/ Name) ecision W	/eapons a	Ind
Support (\$ in Millions	S)			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
		Command Armament Center (CCDC AC) : Picatinny Arsenal, NJ													
Army M-Code Technology Integration & Evaluation Support (Multiple PEOs)	MIPR	Various : Various	-	-		-		1.500	Dec 2020	-		1.500	Continuing	Continuing	Continuing
		Subtotal	4.709	3.712		8.550		11.416		-		11.416	Continuing	Continuing	N/A
Remarks Support consists of labor, to	ravel and ot	her non-labor costs in Fi	scal Year (F	Y) 2021.								_			
			Prior Years	FY 2	2019	FY 2	2020	FY : Ba	2021 ase	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	22.259	13.797		31.267		29.878		-		29.878	Continuing	Continuing	N/A
<u>Remarks</u>															

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Army							Date: February	2020
Appropriation/Budget Activity 2040 / 4	 	R-1 Progra PE 060363 Ammunition	ו m Elemer 9A <i>I Tank a</i> ז	Number/Name) Sured Precision Weapons and					
Event Name	FY 2019	FY 202	20 F	Y 2021	FY 2022	FY 2023		FY 2024	FY 2025
Integrated Product Support - Joint Lethality PNT SME WIPT & Pr									
Integration Risk Mitigation - Family of Scatterable Mines (FASCA									
Integration Risk Mitigation - NA2 for Weapons & Munitions Phas									
Integration Risk Mitigation - NA2 for Weapons & Munitions Phas	e 2								
Integration Risk Mitigation - NA2 for Rocket/Missile Launcher									
Integration Risk Mitigation - Fires System-of-Systems APNT rela	ted AS and NavWar								
Integration Risk Mitigation - Next Generation PNT Technologies	Phase 1								
Weapons & Munitions Prototyping - APNT upgrades for PGM Fu									
Weapons & Munitions Prototyping - APNT upgrades for Towed H									
Weapons & Munitions Prototyping - Alternative Navigation Tech									
Weapons & Munitions Prototyping - Alternative Navigation Tech	nologies Phase 2								
Weapons & Munitions Prototyping - Location Azimuth Determina	tions System (LADS)								
Weapons & Munitions Prototyping - Next Generation PNT Techn	ologies Phase 1								

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Nrmy					Date: February	2020			
Appropriation/Budget Activity 2040 / 4		R- PE <i>Ar</i>	R-1 Program Element (Number/Name)Project (Number/Name)PE 0603639A / Tank and Medium Caliber AmmunitionFA5 / Assured Precision Weapons and Munitions							
Event Name	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025			
Army M-Code Technology Integration and Evaluation										
MGUE Inc 2 for LR-PGK										
				1	1	1	<u> </u>]			

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (N FA5 / Assu Munitions	umber/Name) ured Precision Weapons and

Schedule Details

	S	tart	E	ind
Events	Quarter	Year	Quarter	Year
Integrated Product Support - Joint Lethality PNT SME WIPT & Program Management	1	2017	4	2028
Integration Risk Mitigation - Implement Zero-Age-of-Data (ZAOD)	1	2018	4	2018
Integration Risk Mitigation - Family of Scatterable Mines (FASCAM) Replacement	1	2019	4	2020
Integration Risk Mitigation - NA2 for Weapons & Munitions Phase 1	1	2018	4	2019
Integration Risk Mitigation - NA2 for Weapons & Munitions Phase 2	1	2020	4	2021
Integration Risk Mitigation - NA2 for Rocket/Missile Launcher	1	2020	4	2021
Integration Risk Mitigation - Fires System-of-Systems APNT related AS and NavWar	1	2021	4	2022
Integration Risk Mitigation - Next Generation PNT Technologies Phase 1	1	2023	4	2024
Weapons & Munitions Prototyping - APNT upgrades for PGM Fuze Setter	1	2018	4	2019
Weapons & Munitions Prototyping - APNT upgrades for Towed Howitzer Platforms	1	2018	4	2019
Weapons & Munitions Prototyping - Alternative Navigation Technologies Phase 1	1	2018	4	2019
Weapons & Munitions Prototyping - Alternative Navigation Technologies Phase 2	1	2020	4	2021
Weapons & Munitions Prototyping - Location Azimuth Determinations System (LADS)	1	2020	4	2020
Weapons & Munitions Prototyping - Next Generation PNT Technologies Phase 1	1	2022	4	2023
Army M-Code Technology Integration and Evaluation	1	2020	4	2028
MGUE Inc 2 for LR-PGK	1	2020	4	2027

<u>Note</u>

Notes: Positioning, Navigation and Timing (PNT) Subject Matter Expert (SME) Working Integrated Product Team (WIPT) Network Assisted (NA) Assured Positioning, Navigation and Timing (APNT)

Exhibit R-2A, RDT&E Project Ju	chibit R-2A, RDT&E Project Justification: PB 2021 Army										uary 2020	
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (Number/Name)PE 0603639A / Tank and Medium CaliberFG1 / Cannon-Delivered Area EAmmunitionMunitions (C-DAEM)						n e) ed Area Effe	ects			
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
FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	5.713	21.447	40.961	-	40.961	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Cannon-Delivered Area Effects Munitions (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 the completion of the C-DAEM Armor competitive demonstration phase, which will identify the most promising candidate(s) 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
Title: C-DAEM Armor	5.463	20.473	40.961
Description: C-DAEM Armor will destroy infantry fighting vehicles, self-propelled howitzers, and tanks.			
FY 2020 Plans: FY 2020 funding supported a competitive demonstration phase to identify the most promising candidate(s) that address medium to heavy armored targets.			
FY 2021 Plans: FY 2021 funding will support the completion of the C-DAEM Armor competitive demonstration phase which will identify the most promising candidate(s) 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 to support C-DAEM Armor prototyping hardware and continued risk reduction efforts in support of the competitive demonstration phase.			
Title: C-DAEM DPICM Replacement	0.250	-	-
Description: C-DAEM DPICM Replacement will destroy personnel to light-skinned vehicles.			
Title: FY 2020 SBIR/STTR Transfer	-	0.974	-

Exhibit R-2A, RDT&E Project Justif	fication: PB	2021 Army							Date: Fe	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Pr PE 06 <i>Ammu</i>	ogram Eler 03639A / Ta nition	nent (Numb nk and Medi	Proje FG1 / <i>Muniti</i>	r oject (Number/Name) G1 I Cannon-Delivered Area Effects lunitions (C-DAEM)						
B. Accomplishments/Planned Prog	<u>ırams (\$ in N</u>	<u>/lillions)</u>						[FY 2019	FY 2020	FY 2021
Description: Funding transferred in a	accordance v	with Title 15	USC ?638								
FY 2020 Plans: Funding transferred in accordance w	ith Title 15 U	SC ?638									
FY 2020 to FY 2021 Increase/Decre Funding transferred in accordance w	ease Stateme	ent: SC ?638									
				Accon	nplishments	s/Planned P	rograms Su	btotals	5.713	21.447	40.961
C. Other Program Funding Summa	ry (\$ in Milli	ons)									
			FY 2021	<u>FY 2021</u>	FY 2021					Cost To	
Line Item	<u>FY 2019</u>	<u>FY 2020</u>	<u>Base</u>	<u>000</u>	<u>Total</u>	<u>FY 2022</u>	FY 2023	<u>FY 202</u>	24 <u>FY 202</u>	<u>5</u> Complete	Total Cost
 FJ4: Cannon-Delivered Area Effects Munitions (C-DAEM) E68603: PROJ, ARTY, 155MM C-DAEM INCREMENT 1 	-	-	27.600 0.000	-	27.600 0.000	82.685 -	72.655 72.129	64.44 108.59	40 54.453 93 226.773	3 0.000 3 0.000	301.833 407.495

Remarks

In FY 2021, Project FG1 supports C-DAEM Armor efforts. C-DAEM Armor will transition to Budget Activity 05 PE 0604802A Weapons and Munitions - Eng Dev Project FJ4, Cannon-Delivered Area Effects Munitions (C-DAEM), in FY 2022. In FY 2023, C-DAEM Armor will transition to production. A Procurement of Ammunition, Army (PAA) funding line, Standard Study Number (SSN) E68603, PROJ, ARTY, 155MM C-DAEM INCREMENT 1, is established for this effort.

In FY 2021, the C-DAEM DPICM Replacement effort will transition to BA 05 PE 0604802A Weapons and Munitions - Eng Dev Project FJ4, Cannon-Delivered Area Effects Munitions (C-DAEM). A PAA funding line for C-DAEM DPICM Replacement, 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. The U.S. Government is currently reducing risk by executing prototype testing and evaluation efforts in parallel to decompose the AoA results into selection criteria. C-DAEM will use the selection criteria to sponsor a competitive demonstration for C-DAEM Armor to streamline the acquisition process by leveraging Section 815 of the FY 2016 National Defense Authorization Act (NDAA). C-DAEM will use the Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) to further support the completion of the C-DAEM Armor competitive demonstration phase, in FY 2021, which will inform the Army's cluster munition replacement strategy. Upon completion of the competitive demonstration phase, C-DAEM will proceed to qualification testing of the most promising candidate(s) in accordance with the decisions granted at the Army Requirements Oversight Council (AROC), in April 2018.

Exhibit R-3, RDT&E	Project C	ost Analysis : PB 2	2021 Army	/								Date:	February	2020	
Appropriation/Budg 2040 / 4		R-1 Pro PE 060 <i>Ammur</i>	ogram Ele 3639A / Ta hition	ement (N Tank and	umber/Na Medium C	Project FG1 / C Munitio	c t (Number/Name) Cannon-Delivered Area Effects ions (C-DAEM)								
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2	2021 CO	21 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	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	0.410	0.950	Nov 2018	1.740	Nov 2019	0.950	Oct 2020	-		0.950	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.974		-		-		-	0.000	0.974	-
		Subtotal	0.410	0.950		2.714		0.950		-		0.950	Continuing	Continuing	N/A
Product Development (\$ in Millions)			FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			Target	
Product Development (\$ in Millions)			FY 2019		FY 2020		Base		000		Total			Target	
Cost Category Item	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	Value of Contract
Armor TMRR Phase	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	-	3.753		15.276	Apr 2020	22.100	Dec 2020	-		22.100	Continuing	Continuing	Continuing
		Subtotal	-	3.753		15.276		22.100		-		22.100	Continuing	Continuing	N/A
Remarks Additional funding require	d in Fiscal Ye	ear (FY) 2021 for the co	npletion C-[DAEM Arm	or competitiv	ve demonst	ration efforts	S.				-			
Support (\$ in Millior	ıs)			FY	2019	FY 2020		FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total			
Cost Category Item	Contract Performing Prior Award Award		Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract						
Armor Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center	0.550	0.760	Nov 2018	2.847	Nov 2019	3.011	Oct 2020	-		3.011	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	/ 2020		
Appropriation/Budget Activity 2040 / 4						R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 hition	ement (N Tank and	lumber/N Medium (ame) Caliber	Project (Number/Name) FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)					
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2	2021 CO	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 AC) : Picatinny Arsenal, NJ														
Armor Engineering Support	MIPR	Combat Capabilities Development Command Data Analysis Center (CCDC DAC) : Aberdeen, MD	-	-		0.055	Jan 2020	-		-		-	0.000	0.055	-	
Armor Engineering Support	MIPR	Combat Capabilities Development Command Army Research Lab (CCDC ARL) : Aberdeen, MD	-	-		-		2.400	Oct 2020	-		2.400	Continuing	Continuing) Continuing	
DPICM Replacement Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (CCDC AC) : Picatinny Arsenal, NJ	-	0.250	Nov 2018	-		-		-		-	0.000	0.250	-	
		Subtotal	0.550	1.010		2.902		5.411		-		5.411	Continuing	Continuing	j N/A	
Remarks Additional Engineering Su Test and Evaluation	ipport require	id in FY 2021 in support	of C-DAEN	1 Armor cor	npetitive der 2019	nonstration	efforts. 2020	FY	2021 ase	FY	2021 CO	FY 2021 Total]			
	Contract Method	Performing	Prior		Award		Award		Award		Award		Cost To	Total	Target Value of	

Cost Category Item	& Type	Activity & Location	Years	Cost	Date	Cost	Date	Cost	Date	Cost	Date	Cost	Complete	Cost	Contract
Armor Test Targets	MIPR	Targets Management Office : Redstone, AL	-	-		0.555	Jan 2020	10.000	Jan 2021	-		10.000	0.000	10.555	-
Armor Testing	MIPR	Army Test & Evaluation	-	-		-		2.500	Apr 2021	-		2.500	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Army	y								Date:	February	2020			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)ProPE 0603639A / Tank and Medium CaliberFGAmmunitionMu						Project (Number/Name) FG1 / Cannon-Delivered Area Effects Munitions (C-DAEM)					
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 Cost Date		Award ost Date C		Cost To Complete	Total Cost	Target Value of Contract
		Command (ATEC) : Yuma, AZ															
		Subtotal	-	-		0.555		12.500		-		12.500	Continuing	Continuing	N/A		
Remarks C-DAEM is on Operationa	l and Live Fir	e Test & Evaluation Ove	ersight.									-					
			Prior Years	FY	2019	FY 2020		FY 2021 Base		FY 2	2021 FY 2021 CO Total		Cost To Complete	Total Cost	Target Value of Contract		
		Project Cost Totals	0.960	5.713		21.447		40.961		-		40.961	Continuing	Continuing	N/A		
Remarks Cannon-Delivered Area Et Conventional Munitions (D	ffects Munitic PPICM) Repla	ons (C-DAEM) Armor wil acement will destroy per	l destroy inf sonnel to lig	antry fighti ght-skinned	ng vehicles, vehicles.	self-propelle	ed howitzer	s, and tanks	s. C-DAEM	Dual Purpo	osed Improv	red					

Exhibit R-4, RDT&E Schedule Profile: PB 2021		Date: February 2																
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (NPE 0603639A I Tank and Medium CaliberFG1 I CarAmmunitionMunitions									Number/Name) nnon-Delivered Area Effects s (C-DAEM)							
	FY 2019	FY 20	2020 FY 2021				FY 2022			FY 2023	FY 2024			FY 2025				
Event Name	1 2 3 4	1 2 3	3 4	1 2	3	4	1	2 3	4 1	2 3 4	1	2	3 4	1	1 2	3	4	
C-DAEM AoA, CDD, MS-A Efforts	AoA, CDD, MS-A Efforts																	
Armor Milestone A																		
BONUS Deliveries (Bridging Strategy)		Bridging Strateg	ay.															
Armor TMRR	TMRR																	
Armor Preliminary Design Review (PDR)																		
Armor Competitive Demonstration					3 Demo													
Armor Milestone B					4	<u>4</u> мя-в												
Armor Engineering Manufacturing & Development (EMD)						E	EMD											
Armor Critical Design Review (CDR)								5 CDR										
Armor Milestone C													6 MS-	-0				
DPICM Replacement Qualification and Testing					placement	t Qual	& Testin	9										
Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date	e: February 2020														
--	--	---	---	---														
Appropriation/Budget Activity 2040 / 4	R-1 Program E PE 0603639A / <i>Ammunition</i>	lement (Number/Name) Tank and Medium Caliber	Project (Numb FG1 / Cannon-I Munitions (C-D	er/Name) Delivered Area Effects AEM)														
	Schedule Details																	
		Start		End														

	ິງ	art	E	lu
Events	Quarter	Year	Quarter	Year
C-DAEM AoA, CDD, MS-A Efforts	1	2018	4	2019
Armor Milestone A	1	2019	1	2019
BONUS Deliveries (Bridging Strategy)	1	2020	4	2022
Armor TMRR	1	2019	4	2021
Armor Preliminary Design Review (PDR)	1	2021	1	2021
Armor Competitive Demonstration	3	2021	3	2021
Armor Milestone B	4	2021	4	2021
Armor Engineering Manufacturing & Development (EMD)	1	2022	4	2024
Armor Critical Design Review (CDR)	2	2022	2	2022
Armor Milestone C	4	2024	4	2024
DPICM Replacement Qualification and Testing	1	2021	4	2023

<u>Note</u>

Cannon-Delivered Area Effects Munitions (C-DAEM) Armor will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. C-DAEM Dual Purposed Improved Conventional Munitions (DPICM) Replacement will destroy personnel to light-skinned vehicles. C-DAEM Armor and DPICM Replacement are being developed simultaneously.

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2021 A	vrmy							Date: Fe	bruary 2020		
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	am Elemen 39A I Tank a on	t (Number/ and Medium	' Name) a Caliber	Project (N XT5 / 30m UAS	ct (Number/Name) 30mm Anti-Personnel and Counter			
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	
XT5: 30mm Anti-Personnel and Counter UAS	Inti-Personnel and - 3.730 0.000 0.000 - 0.000 0.000 0.000 0.000 0.000						0.000	0.00	0 0.000	3.730			
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
Helicopter, Increment 1, Version 6. The LW30 airburst cartridge improves the ability of the warfighter to effectively engage anti-personnel/materiel targets due to increased lethality. Airburst capability provides the user with a much higher probability of achieving a first burst kill against enemy personnel targets in the open. The LW30 will retain its dual purpose warhead, allowing it to continue to defeat light armored threats through point detonation. The cartridge provides increased lethal effects against personnel and soft-skin vehicular targets increasing Soldier Survivability on the ground during troops in contact engagements and decreases the required number of rounds to reach the desired lethal effects. There is no funding requested in Fiscal Year (FY) 2021.													
B. Accomplishments/Planned F	Programs (in Million	<u>s)</u>						F۱	⁄ 2019	FY 2020	FY 2021	
Title: Technology Maturation and	l Risk Redu	ction (TMRF	र)							3.730	-	-	
Description: Demonstrating Tec	hnology Re	adiness Lev	el 6 and ac	hieving pre	-Milestone ((MS) B appr	oval.						
					Accomplis	shments/Pl	anned Prog	grams Sub	totals	3.730	-	-	
C. Other Program Funding Sum N/A Remarks D. Acquisition Strategy The development of the Lightwei awarded through an Other Trans environment that will conclude with	nmary (\$ in ght 30mm (action Auth ith a TRL 6	<u>Millions)</u> LW30, 30m ority (OTA). demonstrat	mx113mm) The TMRF ion.	Airburst ca २ effort will	Irtridge durir consist of c	ng the Tech ritical techno	nology Mati ology protot	uration and syping, testi	Risk Reduc	ction (TMR nonstratinູ	R) phase wa	as ant	

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Ammun	ogram Ele 3639A / 7 hition	e ment (N Fank and	lumber/N Medium (ame) Caliber	Project XT5 / 3 UAS	(Numbe 0mm Anti	r/ Name) -Personne	el and Co	unter
Product Developmer	nt (\$ in M	illions)	ſ	FY	FY 2019		FY 2020		FY 2021 Base		2021 CO	21 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
30mm Prototype Design	C/CPFF	General Dynamics : Marion, IL	2.475	-		-		-		-		-	0.000	2.475	-
30mm Prototype Design	C/CPFF	Northrop Grumman Information Systems (NGIS) : Plymouth, Mn	-	3.305	Dec 2019	-		-		-		-	0.000	3.305	-
		Subtotal	2.475	3.305		-		-		-		-	0.000	5.780	N/A
Support (\$ in Million	s)		ſ	FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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)	MIPR	Picatinny Arsenal : New Jersey	-	0.425	Jul 2019	-		-		-		-	0.000	0.425	-
		Subtotal	-	0.425		-		-		-		-	0.000	0.425	N/A
			Prior Years	FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2 O(2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	2.475	3.730		0.000		-		-		-	0.000	6.205	N/A
		·			· · · · · · ·										

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2	021 Army				Date: February	2020
Appropriation/Budget Activity 2040 / 4		R-1 Program Element PE 0603639A / Tank Ammunition	nt (Number/Name) and Medium Caliber	Project (N XT5 / 30m UAS	umber/Name) m Anti-Personne	I and Counter
Event Name	FY 2019 FY	2020 FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Technology Maturation and Risk Reduction (TMRR)	1 2 3 4 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 Prototype Development	30mm Prototype Development					
Fuze Level Bench Testing Award GD-OTS	GD-OTS					
Safe & Arm Miniaturization Award NGIS	2 NGIS					
Technology Readiness Level (TRL) 6 Demonstration		TRU6 Demo				

hibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: F	ebruary 2020	
propriation/Budget Activity 10 / 4	n/Budget Activity PE 0603639A / Tank and Medium Caliber Ammunition					
	Schedule Details	i				
	[Sta	art		End	
Events		Quarter	Year	Quarter	Year	
Technology Maturation and Risk Reduction (TMRR)		1	2018	4	2020	
30mm Prototype Development		4	2018	4	2020	
Fuze Level Bench Testing Award GD-OTS		3	2019	3	2019	
Safe & Arm Miniaturization Award NGIS		2	2020	2	2020	
Technology Readiness Level (TRL) 6 Demonstration		4	2020	4	2020	

<u>Note</u>

Note:

General Dynamics Ordinance and Tactical Systems (GD-OTS) Northrop Grumman Information Systems (NGIS)

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army							Date: February 2020					
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)				R-1 Program Element (Number/Name) PE 0603645A / Armored System Modernization - Adv 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	-	80.106	144.234	151.478	-	151.478	172.700	50.656	44.658	24.979	0.000	668.811
EV7: Combat Vehicle Prototyping	-	80.106	144.234	151.478	-	151.478	172.700	50.656	44.658	24.979	0.000	668.811

A. Mission Description and Budget Item Justification

Armored System Modernization provides focused investment for the technology development of combat vehicles for future battlefields. The purpose of this Program Element's (PE) funding is to integrate the next generation of technology enabled capabilities developed in the Science and Technology (S&T) portfolio and Industry to demonstrate new capabilities to meet emerging military needs, provide hardware for Soldier operational experiment/feedback, and determine integration potential across the current Army portfolio of ground vehicles. The primary efforts include but not limited to, maturing and experimenting with Manned Un-Manned Teaming, in conjunction with the Robotic Combat Vehicle, maturing, integrating and experimenting with a variety of technologies for the Optionally Manned Fighting Vehicle (OMFV), and other legacy combat vehicles/platforms within the Maneuver portfolio.

Armored System Modernization allows for aggressive innovation that could provide a bridge from S&T investment to vehicle integration and operational use. It can inform requirements through User Evaluations, mitigate capability gaps and reduce integration risks. The strategy will be to focus on delivering incremental experimental prototypes to the warfighter to demonstrate Manned Un-Manned Teaming (MUM-T), to integrate technologies to maintain overmatch while demonstrating crew task reductions through crew augmentation enabled by optimized Warfighter Machine Interface (WMI) and sensor fusion. The funding will support virtual and physical concept development, trade studies, technical and operational analyses to assess future concepts and designs. This effort will partner government organic capabilities and Industry for an iterative process to develop combat vehicle concepts and prototypes in order to inform and stabilize future capability requirements, performance characteristics, and affordability, evaluate and update operational concepts, and reduce future acquisition risk. This would also include the support for survivability and lethality requirements/qualifications. In addition, this funding will support program management, system integration labs, technology maturation, integration risk reduction, qualification of key lethality/weapon system and sensor technologies to support current and future increments of the Optionally Manned Fighting Vehicle (OMFV), and other legacy combat vehicles/platforms within the Maneuver portfolio.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Arm	у			Dat	te: February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Component Development & Prototypes (ACD&P)	R-1 Program El PE 0603645A / A	ement (Number/Name) Armored System Moderi	nization - Adv Dev		
B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	84.297	157.656	151.624	-	151.624
Current President's Budget	80.106	144.234	151.478	-	151.478
Total Adjustments	-4.191	-13.422	-0.146	-	-0.146
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-13.422			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-4.191	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	-0.146	-	-0.146

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army							Date: Febr	uary 2020				
Appropriation/Budget Activity 2040 / 4	vityR-1 Program Element (Number/Name) PE 0603645A / Armored System Modernization - Adv DevProj EV7				Project (N EV7 / Com	ject (Number/Name) I Combat Vehicle 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
EV7: Combat Vehicle Prototyping	-	80.106	144.234	151.478	-	151.478	172.700	50.656	44.658	24.979	0.000	668.811
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program supports the Next Generation Combat Vehicle Cross Functional Team (NGCV CFT).

A. Mission Description and Budget Item Justification

Armored System Modernization provides focused investment for the technology development of combat vehicles for future battlefields. The purpose of this Program Element's (PE) funding is to integrate the next generation of technology enabled capabilities developed in the Science and Technology (S&T) portfolio and Industry to demonstrate new capabilities to meet emerging military needs, provide hardware for Soldier operational experiment/feedback, and determine integration potential across the current Army portfolio of ground vehicles. The primary efforts include but not limited to, maturing and experimenting with Manned Un-Manned Teaming, in conjunction with the Robotic Combat Vehicle, maturing, integrating and experimenting with a variety of technologies for the Optionally Manned Fighting Vehicle (OMFV), and other legacy combat vehicles/platforms within the Maneuver portfolio.

Armored System Modernization allows for aggressive innovation that could provide a bridge from S&T investment to vehicle integration and operational use. It can inform requirements through User Evaluations, mitigate capability gaps and reduce integration risks. The strategy will be to focus on delivering incremental experimental prototypes to the warfighter to demonstrate Manned Un-Manned Teaming (MUM-T), to integrate technologies to maintain overmatch while demonstrating crew task reductions through crew augmentation enabled by optimized Warfighter Machine Interface (WMI) and sensor fusion. The funding will support virtual and physical concept development, trade studies, technical and operational analyses to assess future concepts and designs. This would also include the support for survivability and lethality requirements/qualifications. In addition, this funding will support program management, system integration labs, technology maturation, integration risk reduction, qualification of key lethality/weapon system and sensor technologies to support current and future increments of the Optionally Manned Fighting Vehicle (OMFV), and other legacy combat vehicles/platforms within the Maneuver portfolio.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Government Engineering & Program Management	18.694	8.240	15.162
Description: This effort will support Government program management that will cover the costs of government and direct support contractor labor, travel, training, supplies, equipment and facilities to manage the experimental prototyping program as well as the Program Management Office (PMO).			
FY 2020 Plans: The funding supported Government program management that covered the costs of government and direct support contractor labor, travel, training, supplies, equipment and facilities to manage the experimental prototyping program as well as the Program			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603645A <i>I Armored System</i> <i>Modernization - Adv Dev</i>	Projec EV7 /	c t (Number/N Combat Vehi	lame) cle Prototypir	ng
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2019	FY 2020	FY 2021
Management Office (PMO). This also continued management of Mission Enable cost and schedule during the Performance Test and Soldier Experiment; MET-I project transitioned from the design to build phase and prepared for the test pha cost, schedule and performance during the design phase to enable long lead pr and Combat Capabilities Development Command (CCDC) as needed for labor,	ed Technology - Demonstrator (MET-D) Phas D Phase II cost, schedule and performance as ase; and begun management of MET-D Phase rocurement. This funding also supported the F travel, and equipment.	e I s the e II PMOs			
FY 2021 Plans: This funding will support Government program management that will cover the labor, travel, training, supplies, equipment and facilities to manage the experime Management Office (PMO). This funding will be allocated for MET-D Phase II a Command (CCDC) Command, Control, Communications, Computers, Combat Reconnaissance (C5ISR) Phase II & Phase III technology maturation, CCDC A other program management support offices. It will fund the management of the technology maturation, and software and data architecture. This effort will include Shakedown testing, Army Test and Evaluation Command (ATEC) Safety Evaluation MET-D Phase III cost and schedule as the project progresses through the design of th	costs of government and direct support contra ental prototyping program as well as the Progra nd III, Combat Capabilities Development Systems, Intelligence, Surveillance, and rmaments center technology qualification, and experimental prototyping program, continued de management of MET-D Phase II during ation, and the Soldier Operational Experiment gn phase and into the build phase.	actor ram I and			
FY 2020 to FY 2021 Increase/Decrease Statement: Government Engineering and Program Management will increase due to the sin CCDC Armaments Center & other program management support.	multaneous phases of MET-D, CCDC C5ISR,				
<i>Title:</i> Test & Evaluation			8.000	1.170	13.364
Description: Test and Evaluation activities includes contractor and governmen development. Contractor prove-out testing will be conducted using United State testing of prototype vehicles and technologies will evaluate vehicle performance	t testing as well as test documentation as Army test facilities. Government developme a and include user evaluation.	nt			
FY 2020 Plans: The funding conducted MET-D Phase I performance and user evaluation; gather delivered final test report. This furthered the development and refinement of the (TEMP) and test procedures to support Phase II integration, safety, and demon 2021.	ered and analyzed all data; and developed and MET-D Phase II Test and Evaluation Master stration testing set to begin in Fiscal Year (FY	d Plan)			
FY 2021 Plans: The T&E funding will prepare, coordinate, and conduct test and evaluation active to include MET-D Phase II Company-Level Soldier Operational Experiment (SO D Phase III TEMP and test procedures to support Phase III integration, safety, a	vities with ATEC for MET-D Phase II Safety Te DE). This funding will further develop the MET- and demonstration testing. C5ISR will conduct	esting t			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Dat	e: February 20	20
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603645A <i>I Armored System</i> <i>Modernization - Adv Dev</i>	Project (Numb EV7 / Combat	e r/Name) Vehicle Prototy	bing
B. Accomplishments/Planned Programs (\$ in Millions)		FY 201	9 FY 2020	FY 2021
comprehensive and enhanced fabrication, integration, analyst and test and eva qualification testing for survivability and lethality requirements.	luation events along with CCDC conducting			
FY 2020 to FY 2021 Increase/Decrease Statement: Test & Evaluation has increased in FY 2021 due to the execution of MET-D Ph company-level SOE of 6 MET-D vehicles. The increase also includes additiona	ase II Shakedown, ATEC Safety testing and a I testing maturation of technologies and softwa	ire.		
<i>Title:</i> Modeling & Simulation		1.8	334 3.05	0 7.407
Description: The modeling and simulation effort is to assess operational needs Maneuver Battle lab at Fort Benning and One Semi-Automated Forces (OneSA underpinnings to support development of requirements. Modeling and simulation virtual environment to conduct data collection.	s and operational employment by using the (F) modeling. The results will provide the analy- on efforts will produce the ability to experiment	rtical in a		
FY 2020 Plans: This funding refined models utilized across ground vehicle platforms based on updated with technologies identified for MET-D Phase II integration to conduct characteristics and identifying potential integration challenges. Analysis conduct concepts were to inform and stabilize capability requirements, performance characteristics risk.	MET-D Phase I test results. Models then were analysis prior to integration informing performa- ted for performance and operational analysis aracteristics, and operational concepts to redu	ance ce		
FY 2021 Plans: The continued modeling and simulation efforts will produce the ability to experin collection and results that will inform the physical testing desires of the Soldier models from MET-D Phase II technologies are identified for integration into Phase integration in order to inform performance characteristics and identify potential will be conducted with Phase III technology configuration in conjunction with the Manned Un-Manned Teaming (MUM-T) areas of concern that should be address.	ment in a virtual environment to conduct data Operational Experiments (SOE).The update or ase III will be used to conduct analysis prior to integration challenges. Soldier virtual experim e Robotic Combat Vehicle (RCV) to determine ssed prior to execution of the Phase III SOE.	ents any		
FY 2020 to FY 2021 Increase/Decrease Statement: Modeling & Simulation has increased in FY 2021 due to further maturation of th MET-D Phase III and the OMT.	ne virtual and physical concept development o	the		
Title: Experimental Prototyping		51.	578 124.53	4 46.972
Description: This effort will accelerate prototyping and technology maturation, vehicles and internal fusion of data from different sensors and how it will be dis systems. Experimental prototyping allows for aggressive innovation through internal function.	both organic and from Industry, for combat played and used by manned and autonomous egration of next generation technologies deve	oped		

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020)	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603645A <i>I Armored System</i> <i>Modernization - Adv Dev</i>	Projec EV7 /	ct (Number/I Combat Veh	lame) icle Prototypii	ng
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2019	FY 2020	FY 2021
in the S&T portfolio and public/private partnerships. This includes the developm ammunition needed for lethality improvements. Experimentation will help to info platforms and how they will operate, mitigate capability gaps, and reduce techn experimentation will also provide improved capabilities for command and control	nent of the XM-913 and the development of orm requirements for the OMFV and other leg ology maturation and integration risks. The ol of the RCV.	асу			
FY 2020 Plans: This funding delivered the second phase of MET-D experimental prototypes in system level prototype development and integration; maintained system level subased on results from the MET-D Phase I Experimentation. The platform software technologies, improved Warfighter Machine Interface (WMI), and improvements feedback from the Phase I Experiment, MET-D Phase II also updated the softwe station SIL, and software test benches in order to simulate integrated system full. The MET-D Phase II effort begun to build prototypes with increased capabilit technological deliverables. The effort begun with the purchase of long lead marprototype upgrades for integration of the technologies, and system software upper maturation of foundational architectures and technologies for power and mobilit The effort conducted the developmental engineering effort for maturation and invision and situational awareness technologies, sensors, crew interfaces and autors, high voltage power architecture, data architecture, communications, a payloads.	FY 2021. The MET-D Phase II efforts continu oftware; and developed software stability upg are upgrades supported integration of advance s for RCV command and control. Based on are system integration laboratory (SIL), crew inctionality prior to physical integration for Pha- y provided from the next increment of S&T terials and technologies, design of the Phase dates. The effort continued the refinement ar my, lethality, protection, and situational awarem integration of technologies such as indirect driv- tonomous systems for crew augmentation, le active and adaptive protection solutions and	ed rades ed ase II rd ess. ver's thality			
FY 2021 Plans: This funding will deliver the third phase of MET-D experimental prototypes in FY system level prototype development and integration; maintain existing system level based on results from the MET-D Phase II Experimentation. The system softwat technologies, improved WMI, improvements for MUM-T, additional autonomous network architecture, advancements in slip ring technologies, and enhancement also support the development of technologies to include but not limited to; unmassuspension/track, Pre Shot/Laser warning, Aided Target Recognition, MAPS, 50 integrated onto the OMFV and other legacy platforms/vehicles.	Y 2023. The MET-D Phase III efforts will conti evel software; and develop software upgrades are upgrades will support integration of advan s behaviors, improvements in electrical power its to CCDC C5ISR technologies. This funding anned turret, UAS/UGS target feed, 3D printin 0mm MCAS, and hybrid electric power, that v	nue s ced and g will ng, <i>v</i> ill be			
FY 2020 to FY 2021 Increase/Decrease Statement: Experimental Prototyping will decrease in FY 2021 due to the completion of ME of prototyping costs for only two phases simultaneously (MET-D Phase II and II	T-D Phase I in FY 2020 resulting in the exect I) rather than all three. In addition, the amour	ution t of			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020											
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603645A <i>I Armored System</i> <i>Modernization - Adv Dev</i>	Project (Number/Name) EV7 / Combat Vehicle Prototyping									
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2019	FY 2020	FY 2021						
prototyping costs for Phase II has also decreased due to the execution of the into Other support & technology costs.	SOE in FY 2021. Funding has also been broke	n out									
Title: Powertrain Maturation			-	0.690	4.000						
Description: This effort will emphasize improving component engine and trans and transmission cost and manufacturing time. The Army will conduct maturat technology transition from laboratory to operational use and prepare for low rated transmission. This effort will conduct the evaluation of reliability, maintain to a vehicle platform and conduct maturation to the components as a result of	nsmission subsystem maturity and reduce engir ation and demonstration activities to expedite ate initial production of the advanced combat en ability, and logistical analyses necessary to tran f these evaluations.	ne ngine nsition									
FY 2020 Plans: Advanced Combat Engine efforts developed and delivered in FY 2019 under Technology project will be assessed for manufacturability of the design. Desig integration of the components and reduce cost and manufacturing time of the manufacturability of the design which included replacing expensive custom su These efforts led to iterative engine prototypes that required performance test while maintaining their performance capabilities. These were the initial assess analyses necessary to transition to a vehicle platform.	the Advanced Powertrain Demonstrator Science gn improvements will be made to further improve components. In FY 2020, the focus was on the ubcomponents against mass produced hardware ting to ensure they could achieve durability metric sments for the reliability, maintainability, and log	e and e e. rics jistical									
<i>FY 2021 Plans:</i> Focus will be on the manufacturability of the design which includes replacing produced hardware and improving the assembly process to use more automa in iterative engine and transmission prototypes that require performance and while maintaining their performance capabilities. These will be the foundation analyses necessary to transition to a vehicle platform.	expensive custom subcomponents with mass ation and create less waste. These efforts will re durability testing to ensure they can be integrate for the reliability, maintainability, and logistical	esult ed									
FY 2020 to FY 2021 Increase/Decrease Statement: Powertrain Maturation funding has increased in FY 2021 due to the amount of able to build the Advanced Combat Engine and Transmission.	of funding necessary to prepare the contractor to	be									
Title: Other support & technology costs			-	-	64.573						
Description: This effort includes the MET-D Phase II advancements in techn of the software SIL, CCDC C5ISR Phase II & Phase III technology maturation maturation and qualification, as well as supporting the XM-913 development/or	nent										
FY 2021 Plans:											

PE 0603645A: Armored System Modernization - Adv Dev Army

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020					
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603645A <i>I Armored System</i> <i>Modernization - Adv Dev</i>	Project (Number/Name) EV7 I Combat Vehicle Prototyping				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 20	19	FY 2020	FY 2021	
Based on feedback from the MET-D Phase II Experiment and advancements in update software SIL, crew station training simulators, and software test benche functionality prior to physical integration for Phase III. The efforts include but ar Manned Un-Manned Teaming in conjunction with the Robotic Combat Vehicle, a variety of technologies for the OMFV and other legacy combat vehicles/platfor This effort also includes the CCDC C5ISR Army mission command software ma operational analytical studies, and mission targeting support software and algo conduct technology maturation and qualification of survivability and lethality rec such as the development of the XM-913 development/qualification and the dev	o and em th ith d ts					
FY 2020 to FY 2021 Increase/Decrease Statement: The increase in Other support & technology costs in FY 2021 is due to the breat cost.	akout of costs within the Experimental Prototypi	ng				
Title: FY 2020 SBIR/STTR Transfer			-	6.550	-	
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 Subt	otals 80	.106	144.234	151.478	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A Remarks						

D. Acquisition Strategy

This program provides the Optionally Manned Fighting Vehicle and other legacy combat vehicle platforms within the Maneuver portfolio the focused investment for the development and demonstration of technology and prototyping for future combat vehicles in the battlefield. The purpose of this funding is to integrate the next generation of technology enabled capabilities developed in the S&T portfolio to demonstrate new capabilities to meet emerging military needs, provide hardware for Soldier operational evaluation/feedback, to determine integration potential across the current Army portfolio of ground vehicles and to develop platform level prototypes.

				R-1 Pro	gram Ele	ment (N	umbor/N/						
2040 / 4								R-1 Program Element (Number/Name)Project (IPE 0603645A / Armored SystemEV7 / CorModernization - Adv DevEV7 / Cor					
ons)	ſ	FY 2	2019	FY 2	020	FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Performing stivity & 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
rious : Various	-	-		6.550		-		-		-	0.000	6.550	-
Subtotal	-	-		6.550		-		-		-	0.000	6.550	N/A
Product Development (\$ in Millions)			2019	FY 2	:020	FY 2021 Base		FY 2 OC	2021 CO	FY 2021 Total			
Performing ctivity & 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
rious : Various	5.671	31.254	Mar 2019	44.583	Mar 2020	-		-		-	Continuing	Continuing	Continuing
rious : Various	-	15.324	Jul 2019	79.079	Feb 2020	-		-		-	0.000	94.403	-
rious : Various	10.000	5.000	Jul 2019	-		-		-		-	0.000	15.000	-
D : TBD	-	-		0.908	Jul 2020	4.000	Jul 2021	-		4.000	Continuing	Continuing	Continuing
D : TBD	-	-		-		64.573	Jul 2021	-		64.573	Continuing	Continuing	Continuing
D : TBD	-	-		-		46.972	Jul 2021	-		46.972	Continuing	Continuing	Continuing
Subtotal	15.671	51.578		124.570		115.545		-		115.545	Continuing	Continuing	N/A
	[FY 2	2019	FY 2020		FY 2021 Base		FY 2021 OCO		021 FY 2021 O Total			
Performing tivity & 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
I/PEO : Warren,	13.546	18.694	Dec 2018	8.458	Jan 2020	15.162	Jan 2021	-		15.162	Continuing	Continuing	Continuing
Subtotal	13.546	18.694		8.458		15.162		-		15.162	Continuing	Continuing	N/A
	Performing tivity & Location ious : Various Subtotal ns) Performing tivity & Location rious : Various rious : Various rious : Various rious : Various D : TBD D : TBD D : TBD Performing tivity & Location Performing tivity & Location /PEO : Warren, /PEO : Warren, Subtotal	Performing tivity & LocationPrior Yearsious : Various-Subtotal-Subtotal-ns)Performing tivity & LocationPrior Yearsious : Various5.671ious : Various10.000D : TBD-D : TBD-D : TBD-D : TBD-Performing tivity & Location15.671Performing tivity & Location-D : TBD-D : TBD-Performing tivity & Location15.671Performing tivity & LocationPrior Years/PEO : Warren,13.546Subtotal13.546	Performing tivity & LocationPrior YearsCostious : VariousSubtotalns)FY 2Performing tivity & LocationPrior YearsCostious : Various5.67131.254ious : Various5.67131.254ious : Various10.0005.000D : TBDD : TBDD : TBDSubtotal15.67151.578Performing tivity & LocationPrior YearsFY 2Performing tivity & LocationPrior YearsCostPerforming tivity & LocationPrior YearsCost/PEO : Warren, Subtotal13.54618.694Subtotal13.54618.694	Performing tivity & LocationPrior YearsAward Dateious : VariousSubtotalns)Fry 2019Performing tivity & LocationPrior YearsAward Dateious : Various5.67131.254Mar 2019ious : Various5.67131.254Mar 2019ious : Various10.0005.000Jul 2019ious : Various10.0005.000Jul 2019D: TBDD: TBDD: TBDD: TBD15.67151.578Performing tivity & LocationPrior YearsAward DateD: TBDD: TB	FY 2019 FY 2 Performing tivity & Location Prior Years Cost Award Date Cost Subtotal - - 6.550 Subtotal - - 6.550 ns) FY 2019 FY 2 Performing tivity & Location Prior Years Award Cost Award Date Cost Performing tivity & Location Prior Years Cost Jul 2019 FY 2 Performing tivity & Location 9 5.671 31.254 Mar 2019 44.583 rious : Various 5.671 31.254 Jul 2019 79.079 rious : Various 10.000 5.000 Jul 2019 - D : TBD - - 0.908 D : TBD - - - D : TBD - - - Subtotal 15.671 51.578 124.570 FY 2019 FY 2 Performing tivity & Location Years Cost Award Date Cost /PEO : Warren, <td< td=""><td>FY 2019 FY 2020 Performing tivity & Location Prior Years Cost Award Date Award Cost Award Date Subtotal - - 6.550 - ns) FY 2019 FY 2020 Performing tivity & Location Prior Years Award Cost Award Date Award Cost Award Date Performing tivity & Location Prior Years Cost Mar 2019 44.583 Mar 2020 ious : Various 5.671 31.254 Mar 2019 44.583 Mar 2020 ious : Various 10.000 5.000 Jul 2019 79.079 Feb 2020 ious : Various 10.000 5.000 Jul 2019 - - D : TBD - - 0.908 Jul 2020 D : TBD - - - - D : TBD - - - - D : TBD - - - - Performing tivity & Location Prior Years Cost Award Date Award Cost</td><td>Performing tivity & Location Prior Years Cost Award Date Award Cost Award Date Cost Award Date Cost Award Cost Cost Award Date Cost Award Date Cost Award Date Cost Award Date Cost Award Date Cost FY 2019 FY 2010 FY 2010</td><td>Performing tivity & Location Prior Years Cost Cost Award Date Award Cost Award Date Award Cost Award Date ious : Various - - 6.550 - - Subtotal - - 6.550 - - ns) FY 2019 FY 2020 FY 2021 Base - Performing tivity & Location Prior Years Award Cost Award Date Award Cost Award Date Award Cost Award Date 10: : Various 5.671 31.254 Mar 2019 44.583 Mar 2020 - ious : Various 5.671 31.254 Mar 2019 79.079 Feb 2020 - ious : Various 10.000 5.000 Jul 2019 - - - D: TBD - - 0.908 Jul 2020 4.000 Jul 2021 D: TBD - - - 64.573 Jul 2021 D: TBD - - - FY 2020 FY 2021 FY 2019</td><td>Performing tivity & Location Prior Years Cost Cost Award Date Cost Cost Award Date Cost Cost Award Date Cost FY 2021 FY 2021<td>Performing tivity & Location Prior Years Cost Award Date Cost FY 2021 FY 2011 FY 2011</td><td>Performing tivity & Location Prior Years Cost Cost Award Date Cost Cost Award Date Cost Cost Award Date Cost Cost Award Date Cost Cost Award Date Cost FY 2021 Base FY 2021 FY 2021 FY 2021 FY 2021 FY 2021 Total Performing tivity & Location Prior Years Cost Award Date Cost Award Au Cost Award Cost Award Cost Cost <</td><td>Performing tivity & Location Prior Years Cost Award Date Cost Award Date Cost Award Date Cost Award Date Cost Prior Prior Prior Cost Award Cost Award Cost Award Cost Award Cost Co</td><td>Performing tivity & LocationPrior YearsCostAward DateCostAward DateCostAward DateCostAward DateCostAward DateCostCos</td></td></td<>	FY 2019 FY 2020 Performing tivity & Location Prior Years Cost Award Date Award Cost Award Date Subtotal - - 6.550 - ns) FY 2019 FY 2020 Performing tivity & Location Prior Years Award Cost Award Date Award Cost Award Date Performing tivity & Location Prior Years Cost Mar 2019 44.583 Mar 2020 ious : Various 5.671 31.254 Mar 2019 44.583 Mar 2020 ious : Various 10.000 5.000 Jul 2019 79.079 Feb 2020 ious : Various 10.000 5.000 Jul 2019 - - D : TBD - - 0.908 Jul 2020 D : TBD - - - - D : TBD - - - - D : TBD - - - - Performing tivity & Location Prior Years Cost Award Date Award Cost	Performing tivity & Location Prior Years Cost Award Date Award Cost Award Date Cost Award Date Cost Award Cost Cost Award Date Cost Award Date Cost Award Date Cost Award Date Cost Award Date Cost FY 2019 FY 2010 FY 2010	Performing tivity & Location Prior Years Cost Cost Award Date Award Cost Award Date Award Cost Award Date ious : Various - - 6.550 - - Subtotal - - 6.550 - - ns) FY 2019 FY 2020 FY 2021 Base - Performing tivity & Location Prior Years Award Cost Award Date Award Cost Award Date Award Cost Award Date 10: : Various 5.671 31.254 Mar 2019 44.583 Mar 2020 - ious : Various 5.671 31.254 Mar 2019 79.079 Feb 2020 - ious : Various 10.000 5.000 Jul 2019 - - - D: TBD - - 0.908 Jul 2020 4.000 Jul 2021 D: TBD - - - 64.573 Jul 2021 D: TBD - - - FY 2020 FY 2021 FY 2019	Performing tivity & Location Prior Years Cost Cost Award Date Cost Cost Award Date Cost Cost Award Date Cost FY 2021 FY 2021 <td>Performing tivity & Location Prior Years Cost Award Date Cost FY 2021 FY 2011 FY 2011</td> <td>Performing tivity & Location Prior Years Cost Cost Award Date Cost Cost Award Date Cost Cost Award Date Cost Cost Award Date Cost Cost Award Date Cost FY 2021 Base FY 2021 FY 2021 FY 2021 FY 2021 FY 2021 Total Performing tivity & Location Prior Years Cost Award Date Cost Award Au Cost Award Cost Award Cost Cost <</td> <td>Performing tivity & Location Prior Years Cost Award Date Cost Award Date Cost Award Date Cost Award Date Cost Prior Prior Prior Cost Award Cost Award Cost Award Cost Award Cost Co</td> <td>Performing tivity & LocationPrior YearsCostAward DateCostAward DateCostAward DateCostAward DateCostAward DateCostCos</td>	Performing tivity & Location Prior Years Cost Award Date Cost FY 2021 FY 2011 FY 2011	Performing tivity & Location Prior Years Cost Cost Award Date Cost Cost Award Date Cost Cost Award Date Cost Cost Award Date Cost Cost Award Date Cost FY 2021 Base FY 2021 FY 2021 FY 2021 FY 2021 FY 2021 Total Performing tivity & Location Prior Years Cost Award Date Cost Award Au Cost Award Cost Award Cost Cost <	Performing tivity & Location Prior Years Cost Award Date Cost Award Date Cost Award Date Cost Award Date Cost Prior Prior Prior Cost Award Cost Award Cost Award Cost Award Cost Co	Performing tivity & LocationPrior YearsCostAward DateCostAward DateCostAward DateCostAward DateCostAward DateCostCos

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Army	/								Date:	Date: February 2020			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (NPE 0603645A / Armored SystemEV7 / ComModernization - Adv DevEV7 / Com					(Number ombat Ve	r/ Name) hicle Prot	otyping			
Test and Evaluation (\$ in Millions)				FY 2	2019	FY 2	2020	FY 2021 Base		FY 2	2021 CO	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	
Modeling & Simulation	MIPR	Various : Various	3.000	1.834	Mar 2019	3.268	Mar 2020	7.407		-		7.407	Continuing	Continuing	Continuing	
Developmental testing	MIPR	Various : Various	-	8.000	Jul 2019	1.388	Jun 2020	13.364		-		13.364	0.000	22.752	-	
		Subtotal	3.000	9.834		4.656		20.771		-		20.771	Continuing	Continuing	N/A	
			Prior Years	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
		Project Cost Totals	32.217	80.106		144.234		151.478		-		151.478	Continuing	Continuing	N/A	

Remarks



Date: February 2020							
ram Element (Number 645A I Armored System ation - Adv Dev	r/Name)	Project (Number/Name) EV7 / Combat Vehicle Prototyping					
etails							
Sti	art	E	nd				
Quarter	Year	Quarter	Year				
2	2019	4	2019				
4	2019	2	2020				
1	2020	4	2025				
1	2020	3	2020				
2	2020	1	2021				
1	2021	3	2021				
2	2020	4	2021				
4	2021	4	2022				
4	2022	2	2023				
	Jram Element (Numbe 645A / Armored System ration - Adv Dev etails Called State Quarter 2 4 1 1 2 1 2 1 2 4 4 4 4 4	gram Element (Number/Name) 645A / Armored System cation - Adv Dev etails Start Quarter Year 2 2019 4 2019 1 2020 1 2020 2 2020 1 2021 2 2020 4 2021 4 2021 4 2021 4 2021	Date: Feb jram Element (Number/Name) Project (Number/Name) 645A / Armored System EV7 / Combat Vehicle ration - Adv Dev EV7 / Combat Vehicle etails EV7 / Quarter Quarter Year Quarter 2 2019 4 4 2019 2 1 2020 4 2 2020 1 1 2020 3 2 2020 4 1 2021 3 2 2020 4 4 2021 4 4 2021 4				

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army										Date: February 2020			
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)						R-1 Program Element (Number/Name) PE 0603747A <i>I Soldier Support and Survivability</i>							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost	
Total Program Element	-	8.067	9.514	5.841	-	5.841	5.954	6.745	7.123	7.126	0.000	50.370	
610: Food Adv Development	-	4.425	3.721	3.055	-	3.055	3.172	3.968	4.129	4.129	0.000	26.599	
C08: Rapid Equipping Force	-	2.339	5.793	2.786	-	2.786	2.782	2.777	2.994	2.997	0.000	22.468	
EL1: Army Field Feeding Programs	-	1.303	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.303	

A. Mission Description and Budget Item Justification

This Program Element (PE) supports component development and prototyping for organizational equipment, improved individual clothing and equipment that enhance Soldier battlefield effectiveness, survivability, and sustainment. This PE also supports the component development and prototyping of joint service food and combat feeding equipment designed to reduce logistics burden.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	11.735	9.514	9.042	-	9.042
Current President's Budget	8.067	9.514	5.841	-	5.841
Total Adjustments	-3.668	0.000	-3.201	-	-3.201
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-3.668	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	-3.201	-	-3.201

Change Summary Explanation

Decrease of \$3.201M in FY 2021 due to reduction in REF anticipated ATEC testing and evaluation costs for project C08 Rapid Equipping Force.

Exhibit R-2A, RDT&E Project Ju		Date: February 2020										
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060374 <i>Survivabilit</i>	am Elemen 17A / Soldie 19	t (Number / r Support ai	Name) nd	Project (Number/Name) 610 / Food Adv 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
610: Food Adv Development	-	4.425	3.721	3.055	-	3.055	3.172	3.968	4.129	4.129	0.000	26.599
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project provides for the advanced component development and prototyping of Joint Service combat ration components/platforms and field feeding equipment designed to improve warfighter performance and reduce the logistics burden of subsistence support. Efforts funded in this Project support all four Services, the Special Operations Command, and the Defense Logistics Agency. The Army serves as the Executive Agent for this Department of Defense (DoD) program, with oversight and coordination provided by the DoD Combat Feeding Research and Engineering Board as required by DoD Directive (DoDD) 3235.02E. Centralized execution of the DoD Combat Feeding Research and Engineering Program (CFREP) with Joint Service review and approval eliminates unnecessary duplication of efforts across the Services and maximizes use of common materiel solutions. Prototypes validated within this effort transition to 0604713A/Project 548 for System Development and Demonstration.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2021	FY 2021
	FY 2019	FY 2020	Base	000	Total
Title: Joint Service Combat Ration Advanced Development	1.751	2.399	1.652	-	1.652
Description: This effort matures and integrates combat ration technologies and prototypes that enable warfighter maneuver, readiness and effectiveness during highly mobile, dispersed operations. Technologies are transitioned from RDTE Budget Activity 3 projects to provide individual and group combat rations and components with improved capabilities including improved warfighter physical and cognitive performance through optimized nutrition and a reduced logistics burden through weight and cube reduction.					
<i>FY 2020 Plans:</i> Will continue to validate and integrate S&T innovations and COTS/NDI candidate items into existing ration platforms (e.g. Meal, Ready-to-Eat, Unitized Group Ration) to increase operational effectiveness; will conduct T&E of S&T innovations and food component/packaging optimization efforts for integration into prototype CCARs to enable 7-day operations in the absence of resupply and improve readiness through significantly reduced weight, cube, and energy density; will initiate T&E of technologies for integration into prototype Expeditionary Group Rations (EGRs) to decrease the logistics burden and enable group feeding in austere environments; will transition validated prototypes to PE 0604713A/Project 548 for operational testing.					
FY 2021 Base Plans: Will continue to validate and integrate S&T innovations and COTS/NDI candidate items into existing ration platforms to increase operational effectiveness; will conduct T&E of technologies for integration into prototype Expeditionary Group Rations (EGRs) to decrease the logistics burden and enable group feeding in austere					

Appropriation/Budget ActivityR-1 Program Element (Number2040 / 4PE 0603747A / Soldier Support a Survivability	r/ Name) and	Project (N 610 / Food	umber/Nam	ie)	
			Aut Develo		
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
environments; will conduct T&E of non-destructive sampling technologies to meet Defense Health Agency Veterinary Services requirements for rapid detection of contaminants in food; and transition validated prototypes to PE 0604713A/Project 548 for operational testing and evaluation (OT&E).					
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funds realigned to support transition of validated Close Combat Assault Rations (CCAR) prototypes to OT&E					
Title: Joint Service Field Feeding Equipment and Menu Development	2.674	1.153	1.403	-	1.403
Description: This effort matures and integrates field feeding equipment technologies and prototypes in support of the Navy, Air Force, and Marine Corps that reduce the logistics burden, improve efficiency, and decrease operation and support costs as directed by the DoD CFREB. This effort also conducts test and evaluation (T&E) on Navy Standard Core Menu components and preparation techniques to enhance efficiency through standardization across the fleet and reduce labor requirements.					
FY 2020 Plans: Will fabricate prototypes that improve the heating efficiency of rations while reducing overall weight, cube and total lifecycle costs; will initiate T&E of energy conservation technologies for Air Force (USAF) BEAR kitchens; will initiate T&E of upgrades to USMC Expeditionary Field Kitchen (EFK) and new kitchen for shore-based Navy expeditionary units; will initiate T&E of new products and food preparation techniques to enhance menu acceptance and reduce labor requirements; and will transition prototypes to PE 0604713A/Project 548 for operational test and evaluation (OT&E).					
<i>FY 2021 Base Plans:</i> Will conduct T&E of energy conservation technologies for USAF BEAR kitchens; will conduct T&E of upgrades to or new developments for expeditionary field kitchens for use by deployed units in austere environments; will continue to conduct T&E of new products and food preparation techniques to enhance menu acceptance and reduce labor requirements; and will transition prototypes to PE 0604713A/Project 548 for operational test and evaluation (OT&E).					
FY 2020 to FY 2021 Increase/Decrease Statement: Change in funding supports USD(R&E) priorities in support of the National Defense Strategy.					
Title: FY 2020 SBIR/STTR Transfer	-	0.169	-	-	-
Description: Funding transferred in accordance with Title 15 USC ?638					

Exhibit R-2A, RDT&E Project Jus	tification: PB			Date: Feb	ruary 2020						
Appropriation/Budget Activity 2040 / 4	R-1 P PE 06 <i>Survi</i> v	rogram Eler 603747A / Sc /ability	nent (Number oldier Support a	Project (N 610 / Food	Number/Name) d Adv Development						
B. Accomplishments/Planned Pro			FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total				
FY 2020 Plans: Funding transferred in accordance	with Title 15 U	SC ?638									
FY 2020 to FY 2021 Increase/Dec Funding transferred in accordance	rease Statem with Title 15 U	ent: SC ?638									
			Accomplis	hments/Pla	nned Progra	ams Subtotals	s 4.425	3.721	3.055		3.055
C. Other Program Funding Summ	ary (\$ in Milli	ons <u>)</u>									
Line Item • 548: <i>Mil Subsistence Sys</i>	<u>FY 2019</u> 1.092	<u>FY 2020</u> 7.393	FY 2021 Base 2.814	<u>FY 2021</u> <u>OCO</u> -	<u>FY 2021</u> <u>Total</u> 2.814	FY 2022 1.815	<u>FY 2023</u> 1.530	<u>FY 2024</u> 1.610	<u>FY 2025</u> 1.610	Cost To Complete 0.000	<u>Total Cost</u> 17.864
Remarks											

D. Acquisition Strategy

Validated prototypes will transition to System Development and Demonstration for operational test and evaluation.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	y								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	y				R-1 Pro PE 060 <i>Surviva</i>	ogram Ele 3747A / S ability	ement (N Soldier Su	umber/Na Ipport and	ame) /	Project 610 / Fo	(Numbe bod Adv E	r/Name) Developm	ent	
Management Service	es (\$ in N	lillions)		FY	2019	FY	2020	FY 2 Ba	2021 Ise	FY	2021 CO	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 Feeding Program Management	Allot	CCDC Soldier Center, Natick, MA : Natick, MA	7.024	0.468	Oct 2018	0.287	Oct 2019	0.322	Oct 2020	-		0.322	Continuing	Continuing	Continuing
DLA Bill Pay	TBD	Various : Various	2.136	-		-		-		-		-	0.000	2.136	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.169		-		-		-	0.000	0.169	-
	<u> </u>	Subtotal	9.160	0.468		0.456		0.322		-		0.322	Continuing	Continuing	N/A
Product Developme	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
Joint Service Rations and Combat Feeding Equipment	Various	Various : Various	35.001	3.555	Oct 2018	3.265	Oct 2019	2.451	Oct 2020	-		2.451	Continuing	Continuing	Continuing
		Subtotal	35.001	3.555		3.265		2.451		-		2.451	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Mill	ions)		FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
Joint Service Rations and Combat Feeding Equipment	Allot	CCDC Soldier Center, Natick, MA : Natick, MA	0.887	0.402	Oct 2018	-		0.282	Oct 2020	-		0.282	Continuing	Continuing	Continuing
		Subtotal	0.887	0.402		-		0.282		-		0.282	Continuing	Continuing	N/A
			Prior Years	FY	2019	FY	2020	FY 2 Ba	2021 Ise	FY : O	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	45.048	4.425		3.721		3.055		-		3.055	Continuing	Continuing	N/A
Remarks															

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy											Da	te: Februar	y 2020)	
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name)Project (Number/Name)PE 0603747A / Soldier Support and610 / Food Adv DevelopmeSurvivability5000000000000000000000000000000000000								ent					
Event Name	FY 2019	FY 20)20	F	Y 2021		F	Y 2022	2	FY	2023		FY 2024		FY 2	025
Evaluate individual and group ration enhancements and transiti	1 2 3 4	1 2 3	3 4	1 1	2 3 4	4	1 2	2 3	4 1	2	3 4	1	2 3 4	1	2	3 4
Conduct in-house T&E of CCAR and transition to SDD for OT&E																
Conduct in-house T&E of optimized MRE and FSR w/ candidate	CCAR components															
Conduct in-house T&E of EGR and transition to SDD for OT&E																
Conduct I-H T&E of non-destuctive sampling technologies for fo	od contamination															
Provide USN w/CPI, evaluations and menu development to sup																
ID and evaluate advanced galley/scullery equipment for the USI																
Conduct T&E of Galley/Scullery equipment and transition to SDI																
Identify and procure JIMKE prototypes																
Conduct in-house T&E of JIMKE intuitive equipment and transition	n to SDD															
Conduct T&E on rapidly deployable refrigeration prototype																
Award contract for build of prototype mobile galley feeding syste	JSN															
Conduct in-house T&E of mobile feeding galley and transition to																

xhibit R-4, RDT&E Schedule Profile: PB 2021 Army																D	ate: F	ebrua	ary 2	2020	
Appropriation/Budget Activity 2040 / 4							R-1 PE (<i>Sur</i>)	Pro g 0603 /ivab	gran 8747. Dility	n Elen A / So	nen oldie	n t (Num er Supp	ber/Nam	e)	Project (N 610 / Foo	Nun d A	n ber / dv De	Name evelop) mei	nt	
												1		1		1					
Event Name		FY	2019		F	FY 20	020		FY	2021	 	F	Y 2022		FY 2023	<u> </u>	FY	2024	_	FY 2	025
Award contract to fabricate IRefS prototype and conduct in-hous	s	_ Z	_ 3 _ 4		•	2 .	3 4		<u> </u>		4	1 2	3 4		2 3 4	'	2		4	1 2	3 4
Conduct in-house T&E of energy conservation technologies for I	BEAF	R Kitc	hens																		
Conduct in-house T&E of EFK upgrades for USMC																					
Conduct in-house T&E of expeditionary kitchen systems for sho	ore-ba	sed I	lavy units																		

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: February 2020
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0603747A <i>I Soldier Support and</i> <i>Survivability</i>	Project (N 610 / Food	umber/Name) I Adv Development
	Sch	nedule Details		

	St	art	E	nd
Events	Quarter	Year	Quarter	Year
Evaluate individual and group ration enhancements and transition to SDD for OT&E	1	2017	4	2025
Conduct in-house T&E of CCAR and transition to SDD for OT&E	1	2019	4	2020
Conduct in-house T&E of optimized MRE and FSR w/ candidate CCAR components	1	2020	4	2020
Conduct in-house T&E of EGR and transition to SDD for OT&E	1	2020	4	2022
Conduct I-H T&E of non-destuctive sampling technologies for food contamination	1	2021	4	2021
Provide USN w/CPI, evaluations and menu development to support NSCM upgrades	1	2017	4	2025
ID and evaluate advanced galley/scullery equipment for the USN	1	2017	4	2021
Conduct T&E of Galley/Scullery equipment and transition to SDD for OT&E	1	2017	4	2021
Conduct in-house T&E of JSERCS prototype for BEAR Type I kitchen for USAF	1	2017	1	2018
Identify and procure JIMKE prototypes	1	2018	2	2019
Conduct in-house T&E of JIMKE intuitive equipment and transition to SDD for OT&E	2	2019	4	2020
Conduct T&E on rapidly deployable refrigeration prototype	1	2020	4	2020
Award contract for build of prototype mobile galley feeding system for USN	1	2018	1	2019
Conduct in-house T&E of mobile feeding galley and transition to SDD for OT&E	1	2019	1	2020
Award contract to fabricate IRefS prototype and conduct in-house T&E	1	2019	4	2020
Conduct in-house T&E of energy conservation technologies for BEAR Kitchens	1	2020	4	2022
Conduct in-house T&E of EFK upgrades for USMC	1	2020	4	2023
Conduct in-house T&E of expeditionary kitchen systems for shore-based Navy units	1	2020	4	2021

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060374 <i>Survivabilit</i>	am Elemen 17A / Soldie ty	t (Number/ r Support ar	lumber/Name) id Equipping Force				
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
C08: Rapid Equipping Force	-	2.339	5.793	2.786	-	2.786	2.782	2.777	2.994	2.997	0.000	22.468
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Equipment mix and configuration may change based on changes in operational environment and circumstances.

A. Mission Description and Budget Item Justification

The REF FY 2021 RDT&E request is \$2.786 million (Base) is for system integration, testing, and evaluation to support project requirements

The REF is the Army's Quick Reaction Capability (QRC) with the ability to acquire, integrate and sustain Commercial-Off-The Shelf (COTS), Government Off-The-Shelf (GOTS), Non-Developmental Item (NDI), and Non-Standard Equipment (NSE) solutions to meet urgent combat requirements for globally employed forces. It inserts selected future force technologies, capabilities, and surrogate materiel solutions into deployed, deploying, select-prepared to deploy, and transformational forces for operational evaluation, assessment, and evolutionary development. The REF assesses the provided capabilities to improve future solutions to inform materiel development for the future Army capability requirements and to potentially transition the capability to an Army acquisition program.

The REF is an enduring organization (Base funded) per Memorandum, Under Secretary of the Army, 30 Jan 2014, subject: Implementation Plan for Stabilization of the Rapid Equipping Force (REF).

The REF bridges the gap between the Army's traditional acquisition process and immediate equipping needs. The REF pursues tangible solutions that can be equipped rapidly with a goal of 180 days. The REF focuses on finding immediate and effective game-changing capabilities to increase Soldier Readiness, effectiveness, protection, and lethality in any operational environment. The REF 10-Liner process provides the ability to react quickly to an ever-changing enemy who changes in days and months, not years in a complex world. The REF coordinates with the Combatant Command (COCOMs) and Army Service Component Command (ASCCs) in theater to fully understand their urgent needs, for which the REF acquisition capability may identify, procure, deliver, and sustain solutions to the deployed units. Although the REF works directly with Operational Commanders at all levels, it focuses on Brigade level and below to equip solutions to identified capability gaps.

The Army Acquisition Executive designated Program Executive Office (PEO) Soldier as the Milestone Decision Authority (MDA) to institutionalize the acquisition authorities in support of the REF and to provide proper acquisition oversight while enhancing visibility of these efforts. The MDA will ensure flexibility and speed focused on the Soldier's needs serviced by the dedicated REF Program Management Office (PMO). This establishes a formal acquisition reporting chain that leverages existing reporting venues to ensure appropriate Assistant Secretary of the Army (Acquisition, Logistics and Technology) (ASA(ALT)) visibility, oversight, and direction.

The REF capabilities cross all Warfighter Functions:

- 1. Mission Command
- 2. Movement and Maneuver

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army				Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603747A <i>I Soldier Support and</i> <i>Survivability</i>)	Project (N C08 / Rapid	u mber/Nan d Equipping	ne) g Force	
 3. Intelligence 4. Fires 5. Sustainment 6. Protection 						
The RDT&E funding also provides the REF the flexibility to invest in near-term, Most importantly, REF requires RDT&E funds to conduct safety certification (terequirement exists to ensure that REF-provided equipment is safe for Soldiers funds to integrate several different COTS/GOTS and NDI technologies into one	, and innovative solutions. RDT&E funds esting) for non-standard equipment before to use and that any risks are identified ar e capability that solves the tougher and m	are n e it is o nd doo nore c	necessary in equipped to cumented. complex pro	the majorit the Soldier The REF a blems.	ty of all REI r. This critions Iso requires	F projects. cal s RDT&E
The REF requires RDT&E funds to modify, test, and evaluate existing technology problem. REF will also fund deliberate projects in support of technology-solution measure and identify current technologies, and provide information to better in with the intent of enlightening future Army requirements. Example efforts that (SATCOM) and communications systems; tactical and small Combat Out Post, (ISR) and Force Protection systems; Counter Unmanned Aerial Systems (CUA) UAS, and Subterranean (SubT) Operations.	ogies that were developed for one purpose on-scouting to meet anticipated Army nee form Army Training and Doctrine Comma may require RDTE include the following p /Forward Operating Base (COP/FOB) Inte (S); Electronic Warfare (EW) systems; No	e, hov ds an ind (T projec elliger pn-Tao	wever may d to mitigate RADOC) an ts: Tactical nce, Surveil ctical Vehic	be suitable e operation nd other con Satellite Co lance, and les (NTV); F	to solve an al gaps. Th mmunities o ommunicat Reconnaiss Persistent D	other ese efforts of interest, ions sance Duration
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2	019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Rapid Equipping Force	2	.339	5.667	2.786	-	2.786
Description: Funding is provided for the following effort.						
FY 2020 Plans: The REF partner with Army Service Component Commands (ASCC) forces and (SOF) community to support globally deployed Soldiers and regionally aligned. The REF anticipates increased uncertainty regarding the future of Operation In operations in the CENTCOM Area of Responsibility (AOR) requiring additional solutions supporting the reduced numbers of Soldiers operating globally in order the face of a lethal terrorism threat. The REF expects to continue our engagem capability gaps generated by geographical and environmental constraints. Corr understanding of evolving threats and operating conditions within the respective REF also expects to play a much more deliberate role in providing support to the as they prepare for a wider range of response missions. In accordance with REF	d Army Special Operations Force BCTs in all areas of responsibility. herent Resolve (OIR) and other flexibility to develop technological er to fill force protection gaps in hent with the ASCCs to address hversely, the REF will increase its e ASCC areas of operations. The he Global Response Force (GRF) EF?s participation in the Office of					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020						
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/ PE 0603747A / Soldier Support an Survivability	Name) nd	Project (N C08 / Rapi	umber/Nan d Equipping	ne) Force			
Nubit R-2A, RDT&E Project Justification: PB 2021 Army propriation/Budget Activity R-1 Program Element (Numb PE 0603747A / Sodier Suppor Survivability Accomplishments/Planned Programs (\$ in Millions) Survivability cretary of Defense (OSD) led quick reaction capability effort, the Army determined the REF would provide th my?s warm base capability. FWarfighter function areas Wission Command Movement and Maneuver Intelligence Fires Sustainment Protection Sustainment Protection e FY20 funds for projects in the amount of \$279K (10% of Budget); breakout is based on the FY 2019 uirements trend. The REF requires RDT&E funds to te hnologies in order to ensure suitability and safety before equipping the Soldier - any modified COTS//GOTS/ II item has to be tested. 2021 Base Plans: e REF will partner with ASCC forces and Army SOF community to support globally deployed Soldiers and jonally aligned BCTs in all areas of responsibility. The REF anticipates increased uncertainty regarding ionally aligned BCTs in all areas of responsibility. The REF anticipates increased uncertainty regarding ionally aligned BCTs in all areas of responsibility. The REF anticipates increased uncertainty regarding ionally aligned BCTs in all areas of responsibility. The REF anticipates increased uncertainty regarding ionally aligned BCTs in all areas of responsibility. The REF anticipates increased uncertainty regarding ionally aligned BCTs in all areas of responsibility. The REF anticipates increased uncertainty regarding ionally aligned BCTs in all areas of responsibility. The REF anticipates increased uncertainty regarding ionally aligned BCTs in all areas of responsibility. The REF anticipates increased uncert		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total		
Secretary of Defense (OSD) led quick reaction capability effort, the Army dete Army?s warm base capability.	rmined the REF would provide the							
REF Warfighter function areas								
 Mission Command Movement and Maneuver Intelligence Fires Sustainment Protection 								
The FY20 funds for projects in the amount of \$279K (10% of Budget); breakou requirements trend.	It is based on the FY 2019							
The REF anticipates ATEC testing and evaluation cost of \$2.514 million. The technologies in order to ensure suitability and safety before equipping the Solo NDI item has to be tested.	REF requires RDT&E funds to test dier - any modified COTS/GOTS/							
FY 2021 Base Plans: The REF will partner with ASCC forces and Army SOF community to support of regionally aligned BCTs in all areas of responsibility. The REF anticipates inclute future of Operation Inherent Resolve (OIR) and other operations in the CE (AOR) requiring additional flexibility to develop technological solutions support Soldiers operating globally in order to fill force protection gaps in the face of a expects to continue our engagement with the ASCCs to address capability gap and environmental constraints. Conversely, the REF will increase its understate operating conditions within the respective ASCC areas of operations. The REF more deliberate role in providing support to the GRF as they prepare for a wide the Missien Conversely.								
1. Mission Command 2. Movement and Maneuver								

Exhibit R-2A, RDT&E Project Jus	tification: PB	2021 Army							Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4				R-1 Pi PE 06 <i>Surviv</i>	r ogram Ele i 03747A / Sc ability	nent (Numbe Idier Support	er/Name) and	Project (N C08 / Rapi	umber/Nar id Equipping	ne) g Force	
B. Accomplishments/Planned Pro	ograms (\$ in I	<u>/lillions)</u>					FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
 Intelligence Fires Sustainment Protection 											
The FY 2021 funds for projects in the 2019 requirements trend.	ne amount of \$	279K (10%	of Budget); I	breakout is b	based on the	current FY					
The REF anticipates ATEC testing technologies in order to ensure suit NDI item has to be tested.	and evaluatior ability and saf	a cost of \$2.5 ety before e	507 million. quipping the	The REF rec Soldier ? an	quires RDT8 y modified (E funds to tes COTS/GOTS/	st				
FY 2020 to FY 2021 Increase/Dec Decrease in funding from FY 2020 requirements.	to FY 2021 is t	ent: due to receiv	ving fewer th	an estimated	d urgent Wa	rfighter					
Title: FY 2020 SBIR/STTR Transfe	r						-	0.126	-	-	-
Description: Funding transferred in	accordance v	with Title 15	USC ?638								
FY 2020 Plans: Funding transferred in accordance	with Title 15 U	SC ?638									
FY 2020 to FY 2021 Increase/Dec Funding transferred in accordance	rease Statem with Title 15 U	ent: SC ?638									
			Accomplis	hments/Plai	nned Progra	ams Subtotal	ls 2.339	5.793	2.786	-	2.786
C. Other Program Funding Summ	ary (\$ in Milli	<u>ons)</u>	FY 2021	FY 2021	FY 2021					Cost To	
Line Item • M80101: Rapid Equipping Soldier Support Equipment <u>Remarks</u>	<u>FY 2019</u> 22.429	<u>FY 2020</u> 27.877	Base 8.629	<u>0C0</u> 8.500	<u>Total</u> 17.129	<u>FY 2022</u> 10.610	<u>FY 2023</u> 10.365	<u>FY 2024</u> 9.889	<u>FY 2025</u> 9.990	Complete 0.000	<u>Total Cost</u> 108.289
	Our disce to 11th a										

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
204074	PE 0603747AT Soldier Support and Survivability	CU8 I Rapi	a Equipping Force

D. Acquisition Strategy

The Rapid Equipping Force (REF) harnesses current and emerging technologies to provide rapid solutions to the urgently required capabilities of U.S. Army Forces employed globally. The REF focus is on rapidly placing capabilities into Soldiers' hands. This mission is accomplished in one of two ways: 1) rapidly adapting COTS/ GOTS/NDI equipment to meet operational needs, and 2) utilizing emerging deployable capabilities via interaction with research and development organizations and academia. All capabilities are safety tested prior to insertion into operational environments. Training and sustainment are provided for every capability until it is transitioned to an approved acquisition program or terminated through an approved Army process. Operational assessments are conducted to provide feedback in support of Army requirements generation and future capability development. REF capabilities routinely serve as a bridge to specific ONS, JUONS, and JEONS gaps to meet urgent operational requirements.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	y								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 Surviva	o gram El 3747A / S <i>bility</i>	ement (N Soldier Su	umber/N pport and	ame) d	Project C08 / R	(Numbei apid Equi	r/ Name) ipping For	ce	
Management Service	es (\$ in M	illions)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2	2021 CO	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	-	-		0.126		-		-		-	0.000	0.126	-
		Subtotal	-	-		0.126		-		-		-	0.000	0.126	N/A
Product Developmer	nt (\$ in M	illions)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2	2021 CO	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
Mission Command	C/FFP	Various : Various	0.191	0.016		0.019		0.020		-		0.020	0.000	0.246	-
Movement and Maneuver	C/FFP	Various : Various	0.348	0.039		0.081		0.047		-		0.047	0.000	0.515	-
Intelligence	C/FFP	Various : Various	0.288	0.070		0.139		0.084		-		0.084	0.000	0.581	-
Fires	C/FFP	Various : Various	0.010	0.004		0.004		0.005		-		0.005	0.000	0.023	-
Sustainment	C/FFP	Various : Various	0.237	0.017		0.050		0.021		-		0.021	0.000	0.325	-
Protection	C/FFP	Various : Various	0.494	0.088		0.181		0.102		-		0.102	0.000	0.865	-
Dismounted Improvised Explosive Device (IED) Defeat	C/FFP	Various : Various	2.889	-		-		-		-		-	Continuing	Continuing	Continuing
Dismounted Operations Support	C/FFP	Various : Various	4.796	-		-		-		-		-	Continuing	Continuing	Continuing
Intelligence, Surveillance, and Reconnaissance (ISR) Shortfalls in Environmentally Inhospitable OEs	C/FFP	Various : Various	5.951	-		-		-		-		-	Continuing	Continuing	Continuing
Small Combat Outpost (COP) / Patrol Base (PB) Force Protection and Sustainment	C/FFP	Various : Various	3.738	-		-		-		-		-	Continuing	Continuing	Continuing
Other-REF RIPL Priorities (5-10)	C/FFP	Various : Various	8.778	-		-		-		-		-	Continuing	Continuing	-
Other	C/FFP	Various : Various	2.208			-		-		-		-	0.000	2.208	-

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	y								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	y				R-1 Pro PE 060 <i>Surviva</i>	o gram El o 3747A / S <i>bility</i>	ement (N Soldier Su	umber/N Ipport and	ame) 1	Project C08 / R	(Numbe apid Equi	r/ Name) ipping For	ce	
Product Developmer	nt (\$ in M	illions)	ſ	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 O(2021	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
Base: Various Projects- Protect the Force in Counter Insurgency	C/FFP	Various : Various	11.841	-		-		-		-		-	0.000	11.841	-
Small Combat Outpost (COP)/Patrol Base (PB) Sustainment	C/FFP	Various : Various	1.506	-		-		-		-		-	0.000	1.506	-
Base: Various Projects- Enhance Intelligence Surveillance Recon	C/FFP	Various : Various	9.009	-		-		-		-		-	0.000	9.009	-
Small Combat Outpost (COP)/Patrol Base (PB) Force Protection	C/FFP	Various : Various	2.093	-		-		-		-		-	0.000	2.093	-
Dismounted Blue Force Tracking and Mission Command	C/FFP	Various : Various	0.528	-		-		-		-		-	0.000	0.528	-
Base: Various Projects- Logistics/Medical in Counterinsurgency Ops	C/FFP	Various : Various	1.639	-		-		-		-		-	0.000	1.639	-
Base: Various Projects- Timeliness of Analysis and Information Dissemination	C/FFP	Various : Various	6.961	-		-		-		-		-	0.000	6.961	-
Congressional Add-Squad Mission Support System (SMSS)	C/FFP	Various : Various	1.600	-		-		-		-		-	0.000	1.600	-
SSTR/Economic Assumptions/FFRDC and SBIR	C/FFP	Various : Various	1.090	-		-		-		-		-	0.000	1.090	-
OCO: Rapid Equipping Force	C/FFP	Various : Various	19.190	-		-		-		-		-	0.000	19.190	-
		Subtotal	85.385	0.234		0.474		0.279		-		0.279	Continuing	Continuing	N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603747A / Soldier Support and SurvivabilityProject (Number/Name) C08 / Rapid Equipping Force									
Test and Evaluation ((\$ in Milli	ons)		FY 2019		FY 2	020	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
ATEC (REF Integrated Priority List 1-10)	C/FFP	Various : Various	11.344	-		-		-		-		-	Continuing	Continuing	Continuing
ATEC (Warfighter Function Areas)	C/FFP	Various : Various	14.114	2.105		5.193		2.507		-		2.507	0.000	23.919	-
ATEC (REF Integrated Priority List 1-7)	C/FFP	Various : Various	2.000	-		-		-		-		-	0.000	2.000	-
Subtotal 27.458			2.105		5.193		2.507		-		2.507	Continuing	Continuing	N/A	
Prior Years		Prior Years	FY 2	019	FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
		Project Cost Totals	112.843	2.339		5.793		2.786		-		2.786	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A							Date: February	2020	
Appropriation/Budget Activity 2040 / 4		R-1 F PE 0 Survi	Program Elemen 603747A / Soldie ivability	t (Number/Name r Support and	Number/Name) Nid Equipping Force				
EventName	FY 2019	FY 20	20	FY 2021	FY 2022	F	FY 2023 FY 2024		FY 2025
	1 2 3 4	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 Equipping Force									

R-1 Program Element (Number/Name) PE 0603747A / Soldier Support and Survivability Project (Number/Name) C08 / Rapid Equipping Force Schedule Details Schedule Details Events Quarter Year Quarter Year Rapid Equipping Force 2 2021 4 2024	Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army	Date: February 2020						
Schedule DetailsEventsQuarterYearQuarterYearRapid Equipping Force2202142024	Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0603747 <i>F</i> <i>Survivability</i>	R-1 Program Element (Number/Name) PE 0603747A <i>I Soldier Support and</i> <i>Survivability</i>					
StartStartStartEventsQuarterYearQuarterRapid Equipping Force220214		Schedule Detai	ls					
EventsQuarterYearQuarterYearRapid Equipping Force2202142024			Star	rt	End			
Rapid Equipping Force2202142024	Events		Quarter	Year	Quarter	Year		
	Rapid Equipping Force		2	2021	4	2024		
					I			

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	vrmy							Date: Febr	ruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Progr a PE 060374 Survivabilit	am Elemen 17A / Soldie ty	t (Number / r Support a	Project (N EL1 / Army	Number/Name) ny Field Feeding Programs							
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
EL1: Army Field Feeding Programs	-	1.303	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.303
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note Project EL1 efforts complete in F A. Mission Description and Bud This Project provides for the adva Operation and Support (O&S) co in coordination with ration develo effectiveness and quality of life. T maintaining readiness through fire equipment, in addition to reducing costs for logistical support.	Y 2019 Iget Item J anced comp sts of subsi pment effor This project elding and in g sustainme	ustification ponent deve stence supp ts. Project o develops cr ntegrating no ent requirem	lopment an port to servic conducts de itical enable ew equipme nents, relate	d prototypir ce personne monstratior ers that sup ent. This eq ed Combat \$	ng of Army o el. Project s n and valida port the Join uipment enl Support/Cor	combat feed upports dev tion of impr nt Future Fo hances the mbat Servic	ling equipm velopment o oved subsis orce Capabi field Soldier e Support (ent designe f rapidly de stence supp lities and th 's well-bein CS/CSS) de	ed to reduce ployable fiel port items us ne Joint Exp ng and provid emands on l	the logistic Id food serv ed to enha editionary M des the Sol lift, combat	s burden an rice equipme nce soldier Aindset by dier with usa zone footprin	d nt ible nt, and

B. Accomplishments/Planned Prog	<u>rams (\$ in I</u>	<u>Aillions)</u>					FY 2019	FY 2020	FY 2021 Base	FY 2021	FY 2021 Total
Title: Containerized Food Sanitation	1.303	3 -	-	-	-						
Description: Develop and Test a Co the Force Provider Expeditionary (FP											
Accomplishments/Planned Programs Subtotals								3 -	-	-	-
C. Other Program Funding Summa	ry (\$ in Milli	ons)									
			FY 2021	FY 2021	FY 2021					Cost To	
Line Item	<u>FY 2019</u>	<u>FY 2020</u>	Base	000	Total	<u>FY 2022</u>	FY 2023	<u>FY 2024</u>	<u>FY 2025</u>	Complete	Total Cost
• EL2: Army Field	3.301	-	0.000	-	0.000	-	-	-	-	0.000	3.301
Feeding Equipment											
M65806: Assault Kitchen (AK)	4.587	1.673	0.000	-	0.000	-	-	-	-	0.000	6.260
M65801: REFRIGERATED	9.140	14.300	0.000	2.279	2.279	-	-	-	-	0.000	25.719
CONTAINER SYSTEMS											
• R62830: Battlefield Kitchen (BK)	2.024	-	0.000	-	0.000	-	-	-	-	0.000	2.024

PE 0603747A: Soldier Support and Survivability Army

R-1 Line #85
Exhibit R-2A, RDT&E Project J	hibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 4				R-1 P I PE 06 <i>Surviv</i>	R-1 Program Element (Number/Name) PE 0603747A <i>I Soldier Support and</i> <i>Survivability</i>				Project (Number/Name) EL1 <i>I Army Field Feeding Programs</i>				
C. Other Program Funding Sur	<u>nmary (\$ in Milli</u>	<u>ons)</u>											
Line Item Remarks	<u>FY 2019</u>	FY 2020	<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> Complete	Total Cost		

D. Acquisition Strategy

Project development will transition to Engineering and Manufacturing Development (EMD) and into production after thorough testing.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budg 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (Number/Name)PE 0603747A / Soldier Support andEL1 / Army Field Feeding ProgramsSurvivabilitySurvivability									
Management Servic	es (\$ in N	lillions)		FY	2019	FY	FY 2021 FY 20 FY 2020 Base OCC		2021 CO	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 Management Support	Various	PMFSS : Natick, MA	0.477	0.489	Nov 2018	-		-		-		-	0.000	0.966	-
	• •	Subtotal	0.477	0.489		-		-		-		-	0.000	0.966	N/A
Product Developme	nt (\$ in M	illions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY	2021 CO	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
Battlefield Kitchen	Various	PMFSS : Natick, MA	2.632	-		-		-		-		-	0.000	2.632	-
ECD for MTRCS	Various	Various : Various	0.125	-		-		-		-		-	0.000	0.125	-
DESERT	Various	PMFSS : Natick, MA	0.177	-		-		-		-		-	0.000	0.177	-
FSC III	Various	Various : Various	-	0.464	Nov 2018	-		-		-		-	0.000	0.464	-
		Subtotal	2.934	0.464		-		-		-		-	0.000	3.398	N/A
Test and Evaluation	(\$ in Mill	ions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
FSC III	TBD	PMFSS Natick, MA : PMFSS Natick, MA	-	0.350	May 2019	-		-		-		-	0.000	0.350	-
		Subtotal	-	0.350		-		-		-		-	0.000	0.350	N/A
			Prior Years	FY	2019	FY	2020	FY	2021 ase	FY	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	3.411	1.303		0.000		-		-		-	0.000	4.714	N/A
<u>Remarks</u>															

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy						Date: February	2020	
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name)Project (Number/Name)PE 0603747A / Soldier Support and SurvivabilityEL1 / Army Field Feeding Programs						
	514 004 0	52 000		EX 0004	EX 0000	51/ 0000	EX 0004	EX 0005	
Event Name	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	
Award contract for CFSC sinks and burners	1								
Fabricate CFSC test prototype and conduct testing									
Transition CFSC to production	4								

hibit R-4A, RDT&E Schedule Details: PB 2021 Army				Dat	ite: Febru	ary 2020
propriation/Budget Activity 40 / 4	R-1 Program E PE 0603747A <i>I</i> <i>Survivability</i>	Element (Numbe / Soldier Support	Project (Numb EL1 / Army Fie	Number/Name) ay Field Feeding Programs		
	Schedule Details	3				
	Start					
		St	art		En	d
Events		St Quarter	art Year	Quar	Eno	d Year
Events Award contract for CFSC sinks and burners		St Quarter 1	art Year 2019	Quar	Eno rter	d Year 2019
Events Award contract for CFSC sinks and burners Fabricate CFSC test prototype and conduct testing		Quarter 1 1	art Year 2019 2019	Quar 1 4	Ene rter	d Year 2019 2019

Exhibit R-2, RDT&E Budget Item	hibit R-2, RDT&E Budget Item Justification: PB 2021 Army									Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0603766A <i>I Tactical Electronic Surveillance System - Adv Dev</i>							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 FY 2021 FY 2021 OCO Total FY 2022 FY 2023 FY 2024					Cost To Complete	Total Cost
Total Program Element	-	35.667	37.490	194.775	-	194.775	105.297	82.506	72.221	42.440	Continuing	Continuing
907: Tactical Exploitation Of - 35.667 37.490 194.775 National Capabilities-MIP					- 194.775 105.297 82.506 72.221 42.4					42.440	12.440 Continuing Continui	

<u>Note</u>

All funding is in support of the ACTIVE COMPONENT

A. Mission Description and Budget Item Justification

The Tactical Exploitation of National Capabilities (TENCAP) program serves as the Army's centralized lead to perform National Intelligence cross-agency engineering to evaluate, enhance, prototype, and transition Intelligence, Surveillance, and Reconnaissance (ISR) technologies/capabilities developed by Science and Technology (S&T) and other activities across the National Intelligence Community (IC) into Army systems and architectures. TENCAP: (1) ensures continued access to current National and Theater sensors and supporting tactical architectures; and (2) exploits new developments that focus on improving the Analysis and Tasking, Collection, Processing, Exploitation, Dissemination and Feedback (TCPEDF) of intelligence data. This includes efforts to: (1) shorten targeting timelines down to the Platoon level; (2) enhance target identification; (3) provide better target location (accuracy); (4) provide continued coverage of a target; and (5) develop in-theater analytic tools to enable data exploitation in near real-time support to contingency operations.

Tactical Intelligence Targeting Access Node (TITAN) Space prototype system will provide timely assured intelligence for long range precision fires and maneuver in connected and A2AD environments; Assured access to Space ISR: National, Army and Commercial; Software Analytics capability to enable the intelligence cycle with increased speed, precision and accuracy Automated/Assisted Sensor-to-Shooter workflows: speed, scalability, accuracy to support LRPF in an A2AD environment; Modern and consolidated ground station for space and select aerial sensors. TITAN is pending the creation of its own project line 643766.BX9 in FY 2022, once the strategy and validation of the requirement can be finalized within HQDA.

The Multi Domain Sensor System (MDSS) will provide multiple sensing capabilities by developing and prototyping survivable sensor capabilities on higher altitude platforms that can perform effective stand-off operations. MDSS will exploit and disrupt enemy Radio Frequency (RF) capabilities and systems. They include Electronic Intelligence (ELINT), Communications Intelligence (COMINT), Synthetic Aperture Radar (SAR), Moving Target Indicator (MTI), Cyber/EW, Air-Launched Effects (ALE) and Aircraft Survivability sensors. These will allow stand-off operations to detect, locate, identify and track critical targets for the ground commander. Developing and demonstrating this sensing capabilities on higher altitude platforms is the first step toward gaining advantage against threats posed by adversarial anti-access and areadenial efforts in the competition phase of operations.

The Low Earth Orbit (LEO) strategy will provide prototyping, development and experimentation of the Tactical Space Layer (TSL) sensors (electro optical, synthetic aperture radar, and radio frequency) which are designed to provide wide-area, responsive deep area sensing required for beyond line of sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. Follow-on persistent prototype tactical sensor capabilities will be integrated with the Army

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 I BA 4: Advanced	PE 0603766A I Tactical Electronic Surveillance System -	Adv Dev
Component Development & Prototypes (ACD&P)		

Tactical Intelligence Targeting Access Node (TITAN) ground station which will provide direct tasking and assured access directly supporting live-fire S2S demonstrations and assessments. The Low Earth Orbit (LEO) realignment from Program Element (PE) 1206308A Project FE5 to PE 0603766A Project 907 occurs in FY 2022.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	35.667	34.890	26.257	-	26.257
Current President's Budget	35.667	37.490	194.775	-	194.775
Total Adjustments	0.000	2.600	168.518	-	168.518
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-7.400			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	10.000			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	168.518	-	168.518

Change Summary Explanation

The addition of \$52M in FY21 was due to the Multi-Domain Sensing System (MDSS) new start

The addition of \$86.6M in FY21 was due to the Low Earth Orbit (LEO) realignment from Program Element (PE) 1206308A Project FE5 to PE 0603766A Project 907

Exhibit R-2A, RDT&E Project Ju	hibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name)Project (Number/Name)PE 0603766A / Tactical Electronic907 / Tactical Exploitation OrSurveillance System - Adv DevCapabilities-MIP					1e) tion Of Natio	onal			
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	
907: Tactical Exploitation Of National Capabilities-MIP	-	35.667	37.490	194.775	-	194.775	105.297	82.506	72.221	42.440	Continuing	Continuing	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

<u>Note</u>

All funding is in support of the ACTIVE COMPONENT.

A. Mission Description and Budget Item Justification

The Tactical Exploitation of National Capabilities (TENCAP) office serves as the Army's centralized lead to perform National Intelligence cross-agency engineering to evaluate, enhance, prototype, and transition Intelligence, Surveillance and Reconnaissance (ISR) technologies/capabilities developed by Science and Technology (S&T) and other activities across the National Intelligence Community (IC) into Army systems and architectures. TENCAP: (1) ensures continued access to current National and Theater sensors and supporting tactical architectures; and (2) exploits and influences new developments that focus on improving the Analysis and Tasking, Collection, Processing, Exploitation, Dissemination and Feedback (TCPEDF) of intelligence data. This includes efforts to: (1) shorten targeting timelines down to the Platoon level; (2) enhance target identification; (3) provide better target location (accuracy); (4) provide continued coverage of a target; and (5) develop in-theater analytic tools to enable data exploitation in near real-time support to contingency operations.

FY 2021 Base funding in the amount of \$55.975 million provides: (1) Per direction of the Army ISR Task Force and Future Command, initial risk reduction, analytics and engineering development of the prototype for Tactical Intelligence Targeting Access Node (TITAN) space system; (2) Advanced Miniaturized Data Acquisition System (AMDAS) 'Next' system development; AMDAS Dissemination Vehicle (ADV) improvements; Remote Ground Terminal (RGT) development in order to support TITAN Space risk reduction, analytics and prototyping efforts; (3) engineering and collaborative development on multiple validated National Intelligence Community (IC) advanced software and prototype developments that leverage National IC investments for Army use and ensure continuous Army interoperability with National IC assets and architectures; (4) advanced development of capabilities for Air Vigilance (AV) Army Program of Record; and (5) development of TENCAP Radio Frequency Exploitation (TRFE) effort to support future synchronization of SIGINT, Cyber and Electronic Warfare operations.

Multi-Domain Sensing System (MDSS) - FY 2021 base dollars in the amount of \$52 million supports MDSS development and prototyping. The Multi Domain Sensor System (MDSS) will provide multiple sensing capabilities by developing and prototyping survivable sensor capabilities on higher altitude platforms that can perform effective stand-off operations. MDSS will exploit and disrupt enemy Radio Frequency (RF) capabilities and systems. They include Electronic Intelligence (ELINT), Communications Intelligence (COMINT), Synthetic Aperture Radar (SAR), Moving Target Indicator (MTI), Cyber/EW, Air-Launched Effects (ALE) and Aircraft Survivability sensors. These will allow stand-off operations to detect, locate, identify and track critical targets for the ground commander. Developing and demonstrating this sensing capabilities on higher altitude platforms is the first step toward gaining advantage against threats posed by adversarial anti-access and area-denial efforts in the competition phase of operations.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)FPE 0603766A / Tactical ElectronicSSurveillance System - Adv DevG	Project (Number/Name) 907 / Tactical Exploitation Of National Capabilities-MIP			
The Low Earth Orbit (LEO) FY 2021 base dollars in the amount of \$86.80 mill Layer (TSL) sensors (electro optical, synthetic aperture radar, and radio freque line of sight (BLOS) targeting and force maneuver, significantly reducing Sense will be integrated with the Army Tactical Intelligence Targeting Access Node (supporting live-fire S2S demonstrations and assessments. This is not a new so FE5 to PE 0603766A Project 907	lion dollars supports the prototyping, developme ency) designed to provide wide-area, responsiv sor to Shooter (S2S) timelines. Follow-on persiste TITAN) ground station which will provide direct ta start project. LEO ISR project transitions from Pr	nt, and experimen e deep area sensi ent prototype tactionsking and assure ogram Element (P	tation of Taction ng required fo cal sensor cap d access direct E) 1206308A	cal Space r beyond babilities ctly Project	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021	
Title: TENCAP Cross-agency Core Engineering activities		10.634	14.605	10.845	
Description: By utilizing organic and matrix engineering subject matter experies emerging multi-intelligence based technologies to satisfy/accelerate Army Inter Mission Command and Force Protection requirements.	ts, TENCAP collaborates, develops and exploits Iligence, Surveillance, Reconnaissance (ISR),				
FY 2020 Plans: Will work to incorporate Army requirements into earliest stages of National developmulti-intelligence based capabilities; Monitor emerging technologies and system signal technologies; Develop prototypes that improve Army intelligence product	velopments; Ensure Army access to sensors and ems; Exploit advances in commercial imagery and cts.	1			
FY 2021 Plans: Will work to incorporate Army requirements into earliest stages of National demulti-intelligence based capabilities; Monitor emerging technologies and systement and signal technologies; Develop prototypes that improve Army intelligence prototypes will be in the development and integration of TITAN Space prototypes	velopments; Ensure Army access to sensors and ems; Exploit advances in commercial imagery roducts. Approximately 50% of the core TENCAF e.				
FY 2020 to FY 2021 Increase/Decrease Statement: Funds align to TENCAP engineering and management efforts that includes ini prototype development and testing.	tial studies and designs, and progresses to				
Title: Air Vigilance - Advanced Development		5.163	5.479	4.034	
Description: Enhance intelligence, force protection, and indications and warn	ing capabilities under Army TENCAP program.				
FY 2020 Plans: Will continue to develop advanced signal and software enhancements for Air V the programs Capability Drops.	√igilance (AV) Army Program of Record that sup	port			
FY 2021 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603766A <i>I Tactical Electronic</i> <i>Surveillance System - Adv Dev</i>	Project (Number/I 907 / Tactical Explo Capabilities-MIP	Name) Ditation Of Nat	tional
B. Accomplishments/Planned Programs (\$ in Millions) Will continue to develop advanced signal and software enhancements for Air V the programs Capability Drops.	/igilance (AV) Army Program of Record that su	FY 2019	FY 2020	FY 2021
FY 2020 to FY 2021 Increase/Decrease Statement: Funds align to software changes required by capability drop requirements and	newly identified and/or evolving threats.			
Title: Advanced Miniaturized Data Acquisition System(AMDAS)/ AMDAS Diss	emination Vehicle (ADV)	14.760	14.559	8.918
Description: Continue advanced engineering and development efforts to ensure Army Corp-level TENCAP subsystems that provide national data to the tactical classified national systems. Will become subsystem to TITAN Space prototype	ure continued interoperability and effectiveness I warfighter via intelligence community partners e.	of		
FY 2020 Plans: AMDAS Next: Will continue the development of TENCAP new prototype subsy and simulation along with early developmental testing. Continued work on adv processor, to ensure alignment with evolving national architectural enhancement capabilities progress.	ystem antenna, which will include modeling ance sensor development, and design ground ents as the National Technical Means (NTM)			
FY 2021 Plans: AMDAS Next: Will continue the development of TENCAP new prototype subsy and simulation along with early developmental testing. Continued work on adv processor, to ensure alignment with evolving national architectural enhancement capabilities progress. Will become subsystem to TITAN Space prototype.	ystem antenna, which will include modeling ance sensor development, and design ground ents as the National Technical Means (NTM)			
FY 2020 to FY 2021 Increase/Decrease Statement: Funds align with progression of engineering efforts from requirement refineme system sub-element prototype development and initial developmental testing.	nt, studies and initial design development, into			
<i>Title:</i> TENCAP Radio Frequency Exploitation (TRFE)		5.092	2.847	2.178
Description: Prototype capability software that informs, influences and enhans such as Terrestrial Layer System (TLS) by targeting modern digital communication armies. Assists with Battlespace RF Characterization for modern communication SIGINT, Cyber and Electronic Warfare operations. Utilizes commercial industrial hardware costs, risk and maximizes scalability/modularity.	ces MULTI-INT sensor systems within PEO IEV ations systems employed by near-peer nation s on environments with the intent to synchronize y components and architectures to minimize	V&S ate		
FY 2020 Plans:				

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: F	ebruary 2020)		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603766A <i>I Tactical Electronic</i> <i>Surveillance System - Adv Dev</i>	Project (Nu 907 / Tactic Capabilities	u mber/N al Explo s-MIP	Name) Ditation Of Na	tional
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2019	FY 2020	FY 2021
Continue to develop the MULTI-INT TRFE cognitive software based SIGIN prototype capability focused on countering Peer State and modern commu	IT-Enabled Electronic Warfare and Cyber Attack inication targets and threats.				
FY 2021 Plans: Continue to develop the MULTI-INT TRFE cognitive software based SIGIN prototype capability focused on countering Peer State and modern commu	IT-Enabled Electronic Warfare and Cyber Attack inication targets and threats.				
FY 2020 to FY 2021 Increase/Decrease Statement: Funds decrease align with the advanced development and prototyping effo	orts.				
Title: Tactical Intelligence Targeting Access Node (TITAN) Space Prototyp	be System		-	-	30.000
Description: Tactical Intelligence Targeting Access Node (TITAN) Space for long range precision fires and maneuver in connected and A2AD enviro and Commercial; Software Analytics capability to enable the intelligence of Automated/Assisted Sensor-to-Shooter workflows: speed, scalability, accu and consolidated ground station for space and select aerial sensors TITAN is pending the creation of its own project line 643766BX9 in FY 202 can be finalized within HQDA.	prototype system will provide timely assured intell onments; Assured access to Space ISR: National, ycle with increased speed, precision and accuracy iracy to support LRPF in an A2AD environment; M 22 once the strategy and validation of the requirem	gence Army odern ent			
<i>FY 2021 Plans:</i> Continue the development and integration of the TITAN space prototype so Overhead Systems (NOS) GEOINT and SIGINT capability. Continue to de (RGT) and LEO constellation, the downlink, ingest and processing of commintegration of automated target recognition along with integrating the fires a Precision Fires (LRPF).	ystem that will provide rapid availability of Nationa evelop and integrate with the Remote Ground Term mercial imagery. Continue the development and architecture to support Army's #1 priority, Long Ra	inal nge			
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 increase supports advanced development and prototyping efforts					
Title: Multi-Domain Sensing System (MDSS)			-	-	52.000
Description: The Multi Domain Sensor System (MDSS) will provide multip survivable sensor capabilities on higher altitude platforms that can perform Intelligence (ELINT), Communications Intelligence (COMINT), Synthetic A Cyber/EW, Air-Launched Effects (ALE) and Aircraft Survivability sensors.	ble sensing capabilities by developing and prototype n effective stand-off operations. They include Elect perture Radar (SAR), Moving Target Indicator (MT	bing tronic 1),			

Exhibit R-2A, RDT&E Project Jus	tification: PB	2021 Army							Date: Fe	ebruary 2020	
Appropriation/Budget Activity 2040 / 4				R-1 Pi PE 06 <i>Surver</i>	ogram Eler 03766A / Ta illance Syste	nent (Numb ctical Electro em - Adv Dev	er/Name) onic /	Projec 907 / 7 Capab	t (Number/N actical Explo lities-MIP	ame) itation Of Nat	ional
B. Accomplishments/Planned Pro	ograms (\$ in N	<u> ////////////////////////////////////</u>						Γ	FY 2019	FY 2020	FY 2021
MDSS is pending the creation of its finalized within HQDA.	own project li	ne in FY 202	2 once the s	strategy and	validation o	f the require	nent can be				
FY 2021 Plans: Funding supports MDSS prototype	efforts										
FY 2020 to FY 2021 Increase/Dec FY 2021 increase supports new ME	rease Statem DSS prototype	e nt: effort									
Title: Low Earth Orbit Satellite Cap	ability								-	-	86.800
 Description: The Low Earth Orbit (Layer (TSL) sensors (electro optical deep area sensing required for bey Shooter (S2S) timelines. FY 2021 Plans: Provides for follow-on persistent pro- integrated with the Army Tactical In assured access directly supporting FY 2020 to FY 2021 Increase/Dec 	(LEO) effort will ond line of sight ototype, develo telligence Targ live-fire S2S d	I support the erture radar, nt (BLOS) ta opment, and geting Acces emonstration	e prototyping and radio fr rgeting and experimenta s Node (TIT ns and asses	, developme equency) de force maneu ation of tactio AN) ground ssments.	ent, and expo signed to pr ver, significa cal sensor ca station whic	erimentation ovide wide-a antly reducin apabilities wi h will provide	of Tactical S area, respons g Sensor to nich will be e direct taski	Space sive ng and			
Funding increase supports the Low	Earth Orbit Sa	atellite protot	ype effort						0.019		
Description: EV 2018 NDAA SEC 025 MD		un st Overrun							0.016	-	-
Description. FT 2016 NDAR SEC	023 MDAF CU	St Ovenun		•		(D) I D			05.007	07.400	404 775
				Accon	nplishment	s/Planned P	rograms St	ibtotals	35.667	37.490	194.775
C. Other Program Funding Summ	hary (\$ in Milli	ons <u>)</u>								- · -	
<u>Line Item</u> • 0605766A: National Capabilities Integration (MIP) • OMA - 122011: Contractor Logistics Support and Other Weapon Support	FY 2019 12.340 2.052	FY 2020 7.835 -	FY 2021 Base 7.670 2.132	<u>FY 2021</u> <u>OCO</u> - -	FY 2021 Total 7.670 2.132	FY 2022 11.671 2.175	FY 2023 11.044 2.217	<u>FY 202</u> 11.28 2.28	FY 2028 9 13.600 5 2.330	<u>Cost To</u> <u>Complete</u> 0 0.000	<u>Total Cost</u> 75.449 13.191

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Exhibit R-2A, RDT&E Project	Justification: PB	2021 Army							Date: Fel	bruary 2020	
Appropriation/Budget Activity 2040 / 4					ogram Eler 03766A / Ta llance Syste	nent (Numb ctical Electro m - Adv Dev	Project (I 907 / Taci Capabilitio	t (Number/Name) actical Exploitation Of National ilities-MIP			
C. Other Program Funding Su	mmary (\$ in Milli	ons <u>)</u>									
			FY 2021	<u>FY 2021</u>	FY 2021					<u>Cost To</u>	
Line Item	<u>FY 2019</u>	FY 2020	Base	000	<u>Total</u>	<u>FY 2022</u>	FY 2023	<u>FY 2024</u>	<u>FY 2025</u>	<u>Complete</u>	Total Cost
Demerike											

<u>Remarks</u>

D. Acquisition Strategy

The Army Tactical Exploitation of National Capabilities (TENCAP) mission is a Congressionally-mandated and chartered enduring requirement to leverage National Intelligence capabilities useful to the tactical Army. The Army TENCAP acquisition strategy is driven by an annual TENCAP General Officer Steering Group (TGOSG), co-chaired by the Army G2, Army G8, Military Deputy to the Assistant Secretary of the Army for Acquisition, Logistics, and Technology [ASA(ALT)], and includes representatives from the Army G3, Army G6, Army Training and Doctrine Command (TRADOC), and the Program Executive Office for Intelligence, Electronic Warfare and Sensors (PEO IEW&S). The TGOSG reviews, validates, prioritizes, and guides Army TENCAP efforts, according to Army and Defense strategy. Based on the TGOSG guidance, Army TENCAP invests BA 6.4 RDTE in Intelligence Community (IC) developments during the more cost-effective advanced development phase to ensure Army requirements are met with minimal redundancy to Army investments. Army TENCAP then uses BA 6.5 RDTE to manage the transition of these advanced development efforts through system development and integration into Army Programs of Record (POR). This strategy ensures these leveraged investments remain viable through multiple budget cycles, significantly increasing successful transition to recipient Army PORs. With acquisition discipline and oversight provided by PEO IEW&S, Army TENCAP executes the TGOSG approved efforts through use of multiple contracts and agreements with the military, National Intelligence agencies, labs, industry partners and academia for the full duration required to complete development and transition these national capabilities into enduring Army programs.

Tactical Intelligence Targeting Access Node (TITAN) Space prototype system will provide timely assured intelligence for long range precision fires and maneuver in connected and A2AD environments; Assured access to Space ISR: National, Army and Commercial; Software Analytics capability to enable the intelligence cycle with increased speed, precision and accuracy Automated/Assisted Sensor-to-Shooter workflows: speed, scalability, accuracy to support LRPF in an A2AD environment; Modern and consolidated ground station for space and select aerial sensors TITAN is pending the creation of its own project line 643766BX9 in FY 2022 once the strategy and validation of the requirement can be finalized within HQDA.

Multi-Domain Sensing System (MDSS) - FY 2021 base dollars in the amount of \$52 million supports MDSS development. The Multi Domain Sensor System (MDSS) will provide multiple sensing capabilities by developing and prototyping survivable sensor capabilities on higher altitude platforms that can perform effective stand-off operations. MDSS will exploit and disrupt enemy Radio Frequency (RF) capabilities and systems. They include Electronic Intelligence (ELINT), Communications Intelligence (COMINT), Synthetic Aperture Radar (SAR), Moving Target Indicator (MTI), Cyber/EW, Air-Launched Effects (ALE) and Aircraft Survivability sensors. These will allow stand-off operations to detect, locate, identify and track critical targets for the ground commander. Developing and demonstrating this sensing capabilities on higher altitude platforms is the first step toward gaining advantage against threats posed by adversarial anti-access and area-denial efforts in the competition phase of operations.

The Low Earth Orbit (LEO) FY 2021 base dollars in the amount of \$86.80 million dollars supports the prototyping, development, and experimentation of Tactical Space Layer (TSL) sensors (electro optical, synthetic aperture radar, and radio frequency) designed to provide wide-area, responsive deep area sensing required for beyond line of sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. On-going Army S&T, Joint Capability Technology

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603766A <i>I Tactical Electronic</i> <i>Surveillance System - Adv Dev</i>	Project (N 907 / Tactio Capabilities	umber/Name) cal Exploitation Of National s-MIP

Demonstrations, National and industry prototype efforts will continue experimentation in FY21. Follow-on persistent prototype tactical sensor capabilities will be integrated with the Army Tactical Intelligence Targeting Access Node (TITAN) ground station which will provide direct tasking and assured access directly supporting live-fire S2S demonstrations and assessments.

Appropriation/Budget Activity 2040 / 4 R-1 Program Element (Number/Name) PE 0503766 / Tactical Electronic Surveillance System - Adv Dev Project (Number/Name) 907 / Tactical Exploitation Of National Capabilities-MIIP Management Services (\$ in Millions) FY 2019 FY 2020 FY 2021 Base FY 2021 Dec FY 2021 Total FY 2021 Total Contract Engineers (SETA) Contract & Type Performing Activity & Location Prior Years Cost Award Date Cost Award Date Award Cost Award Date Cost Award Date Cost Cost Award Date Cost Cost Award Date Cost FY 2021	
Management Services (\$ in Millions) $FY 2019$ $FY 2020$ $FY 2021$ <th></th>	
Cost Category Item Method Engineers (SETA)Contract Method Civity & Location Activity & Location 	
TENCAP Intelligence Engineers (SETA)C/FPAFPerspecta : Alexandria, VA22.7313.015Jan 20193.100Jan 20201.500Jan 20211.5000.00030.346CompositionTENCAP Intelligence Engineers (Matrix Gov)MIPRC/TBD7.2571.300Jan 20192.300Jan 20201.200Jan 20211.2000.00012.057ComTENCAP Intelligence Engineers (Matrix Gov)C/TBDTBDTBD1.307Jan 20211.3070.00013.07ComTENCAP Intelligence Engineers (Matrix Gov) for TITAN Space prototype developmentC/TBDTBD1.307Jan 20211.3070.0001.307ComTENCAP Intelligence Engineers (Matrix Gov) for TITAN Space prototype developmentMIPRArmy Geospatial Center (AGC) : Alexandria, VA1.307Jan 20211.3070.0001.307ComTENCAP Intelligence Engineers (Matrix Gov) for TITAN Space prototype developmentMIPRArmy Geospatial Center (AGC) : Alexandria, VA1.307Jan 20211.3070.000 </th <th>Target alue of ontract</th>	Target alue of ontract
TENCAP Intelligence Engineers(Matrix Gov) MIPR Army Geospatial Cener (AGC) : Alexandria, VA 7.257 1.300 Jan 2019 2.300 Jan 2020 1.200 Jan 2021 - 1.200 0.000 12.057 Con TENCAP Intelligence Engineers (SETA) for TITAN Space prototype development C/TBD TBD : TBD - - Image: Constraint of the state of the stat	ontinuing
TENCAP Intelligence Engineers (SETA) for TITAN Space prototype development C/TBD TBD : TBD - - - 1.307 Jan 2021 - Image: Set and the set and	ontinuing
TENCAP Intelligence Engineers (Matrix Gov) for TITAN Space prototype development Army Geospatial Center (AGC) : Alexandria, VA 0 0.900 Jan 2021 0 0.900 0.9	ontinuing
SETA Support MDSS TBD PM SA1 : Aberdeen, MD 2.000 Nov 2020 2.000 0.000 2.000 0.000 2.000 SETA Support LEO TBD A-PNT / TENCAP : Multiple locations 5.000 Jan 2021 5.000 0.000 5.000 5.000 5.000 0.000 5.000 0.000 5.000 0.000 5.000 0.000 5.000 0.000 5.000 0.000 5.000 0.018 0.018 0.018 0.018 0.019 11.907 11.907 0.000 51.628 11.907 11.907 11.907 11.907 -	-
SETA Support LEO TBD A-PNT / TENCAP : Multiple locations - - - 5.000 Jan 2021 - 5.000 0.000 5.000 0.000 5.000 0.000 5.000 0.000 5.000 0.000 5.000 0.000 5.000 0.000 5.000 0.000 0.018 - - - - 0.000 0.018 - - - 0.000 0.018 - - - 11.907 - 11.907 0.000 51.628 - Product Development (\$ in Millions) EX 2010 EX 2020 FY 2021 FY 2021 FY 2021 FY 2021 FY 2021 FY 2021	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun TBD TENCAP : Alexandria - 0.018 - - - - 0.000 0.018 Subtotal 29.988 4.333 5.400 11.907 - 11.907 0.000 51.628 Product Development (\$ in Millions)	-
Subtotal 29.988 4.333 5.400 11.907 - 11.907 0.000 51.628 Product Development (\$ in Millions) EX 2020 FY 2021 FY 2021 FY 2021 FY 2021 FY 2021	-
Product Development (\$ in Millions)	N/A
Contract MethodContract PerformingPriorAwardCostDateCost<	larget alue of ontract
TENCAP Core (Focus) Areas Various Multiple : Multiple 18.491 3.161 Feb 2019 5.980 Feb 2020 5.920 - 5.920 0.000 33.552 Control	ontinuing
Air Vigilance MIPR Classified : MIPR 9.575 5.163 Jan 2019 5.479 Jan 2020 4.034 Jan 2021 - 4.034 0.000 24.251 Conf	ontinuing
AMDAS/ADV (capability transitions to TITAN Space prototype) MIPR Classified : MIPR 17.690 14.760 Jan 2019 12.959 Jan 2020 8.918 Jan 2021 - 8.918 0.000 54.327 Control	ontinuing
TRFE MIPR Classified : MIPR - 5.121 Jan 2019 2.847 Jan 2020 2.178 Jan 2021 - 2.178 0.000 10.146 Control	ontinuing

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	St Analysis. 1 D 2										Date:	February	2020		
ctivity					R-1 Pro PE 060 Surveill	R-1 Program Element (Number/Name)Project (Number/Name)PE 0603766A I Tactical Electronic907 I Tactical Exploitation Of NationalSurveillance System - Adv DevCapabilities-MIP							al		
6 in Mil	llions)		FY 2	2019	FY 2	020	FY 2 Ba	2021 se	FY 2 OC	2021 CO	FY 2021 Total				
ontract ethod 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	
C/TBD	Classified : TBD	-	-		-		24.102	Jan 2021	-		24.102	0.000	24.102	Continuing	
TBD	TBD : TBD	-	-		-		12.000	Nov 2020	-		12.000	0.000	12.000	-	
TBD	TBD : TBD	-	-		-		9.000	Feb 2021	-		9.000	0.000	9.000	-	
TBD	TBD : TBD	-	-		-		24.750	Jul 2021	-		24.750	0.000	24.750	-	
TBD	A-PNT / TENCAP : Multiple Locations	-	-		-		70.400	Jan 2021	-		70.400	0.000	70.400	-	
,	Subtotal	45.756	28.205		27.265		161.302		-		161.302	0.000	262.528	N/A	
		Γ	FY 2	2019	FY 2	020	FY 2 Ba	2021 se	FY 2	2021 CO	FY 2021 Total]			
ontract ethod 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	
Allot	Army TENCAP : Alexandria, VA	13.731	2.258	Jan 2019	3.900	Jan 2020	2.311	Jan 2021	-		2.311	0.000	22.200	Continuing	
MIPR	Army Geospatial Center (AGC) : Alexandria, VA	3.102	0.475	Jan 2019	0.500	Jan 2020	0.525	Jan 2021	-		0.525	0.000	4.602	Continuing	
Allot	Army TENCAP : Alexandria, VA	-	-		-		1.800	Jan 2021	-		1.800	0.000	1.800	Continuing	
Allot TBD	Army TENCAP : Alexandria, VA PM SAI : Aberdeen, MD	-	-		-		1.800 2.500	Jan 2021 Nov 2020	-		1.800 2.500	0.000	1.800 2.500	Continuing -	
Allot TBD TBD	Army TENCAP : Alexandria, VA PM SAI : Aberdeen, MD A-PNT / TENCAP : Multple Locations	-	-		-		1.800 2.500 3.400	Jan 2021 Nov 2020 Oct 2020	-		1.800 2.500 3.400	0.000	1.800 2.500 3.400	Continuing - -	
	in Mi htract thod TBD BD BD BD BD BD BD htract thod Type Ilot	in Millions) Tract Thod Type Classified : TBD Classified	in Millions) Tract thod Performing Activity & Location Prior Years TBD Classified : TBD Classified : TBD TBD TBD : TBD : TBD : TBD TBD : TBD : TBD : TBD TBD : TBD : TBD : TBD : TBD TBD : TBD : TBD : TBD : TBD TBD :	in Millions) FY 2 htract thod Performing Activity & Location Years Cost TBD Classified : TBD Classified	in Millions) FY 2019 ntract thod Type Performing Activity & Location Prior Years Cost Award Date TBD Classified : TBD - - - BD TBD : TBD - - - BD A-PNT / TENCAP : Multiple Locations - - - Tract Performing Multiple Location Prior Years Cost Award Date Itract Performing Activity & Location Prior Years Location Award Date Itract Army TENCAP : Alexandria, VA 13.731 2.258 Jan 2019 IIPR Army Geospatial Center (AGC) : 3.102 0.475 Jan 2019	Surveilla FY 2019 FY 2 Intract thod Performing Prior Award Cost Award Cost TBD Classified : TBD - <	in Millions) FY 2019 FY 2020 htract thod Performing Activity & Location TBD Classified : TBD Prior TBD Classified : TBD - Cost Award BD TBD : TBD - Cost Cost Cost Cost BD TBD : TBD - Cost Cost Cost Cost Cost BD TBD : TBD Cost Cost Cost Cost Cost Cost Cost Cost	Surveillance System - Adv FY 2019 FY 2020 FY 2 Intract thod Performing Prior Years Award Date Cost 12.000 BD TBD : TBD - - - 9.000 24.750 BD TBD : TBD - - - 24.750 24.750 24.750 BD TBD : TBD - - - - 24.750 24.750 24.750 24.750 24.750 24.750 24.750 24.750 24.750 24.750 24.750 24.750 24.750 24.750 24.750 24.750 24.750	Surveillance System - Adv Devin Millions)FY 2019FY 2020FY 2021 Basentract thod Performing Activity & LocationPrior YearsAward DoteAward DoteAward DoteAward DoteAward DoteTBDClassified : TBDAward DoteAward DoteAward DoteTBDClassified : TBDAward DoteAward DoteAward DoteTBD : TBDBD : TBDBD : TBDBD : TBDBD : TBDBD : TBD : TBD <t< td=""><td>$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$</td><td>Surveillance System - Adv Dev Capability in Millions) FY 2019 FY 2020 FY 2021 Base FY 2021 ntract thod Performing Activity & Location Prior Cost Award Cost Award Award Cost Award Award Award Award Award Award Award Date Cost Award Date Cost Award Date Cost Award Date Cost Award TBD C C C C C Cost Date Co</td><td>Surveillance System - Adv Dev Capabilities-MIP in Millions) FY 2019 FY 2020 FY 2021 Total thract thod Performing Prior Cost Award Cost Cost Cost Cost Cost <th colspan<="" td=""><td>Surveillance System - Adv Dev Capabilities-MIP In Millions) FY 2019 FY 2021 Cost To Cost To Complete TBD Classified : TBD State</td><td>Surveillance System - Adv Dev Capabilities-MIP In Millions) FY 2019 FY 2021 FY 2021 FY 2021 FY 2021 Total In Millions) FY 2019 FY 2019 FY 2019 FY 2017 FY 2017 FY 2021 FY 2021 FY 2021 Total Intract thood Performing Prior Qees for Cost Qees for Cost Total TBD Cost C</td></th></td></t<>	$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Surveillance System - Adv Dev Capability in Millions) FY 2019 FY 2020 FY 2021 Base FY 2021 ntract thod Performing Activity & Location Prior Cost Award Cost Award Award Cost Award Award Award Award Award Award Award Date Cost Award Date Cost Award Date Cost Award Date Cost Award TBD C C C C C Cost Date Co	Surveillance System - Adv Dev Capabilities-MIP in Millions) FY 2019 FY 2020 FY 2021 Total thract thod Performing Prior Cost Award Cost Cost Cost Cost Cost <th colspan<="" td=""><td>Surveillance System - Adv Dev Capabilities-MIP In Millions) FY 2019 FY 2021 Cost To Cost To Complete TBD Classified : TBD State</td><td>Surveillance System - Adv Dev Capabilities-MIP In Millions) FY 2019 FY 2021 FY 2021 FY 2021 FY 2021 Total In Millions) FY 2019 FY 2019 FY 2019 FY 2017 FY 2017 FY 2021 FY 2021 FY 2021 Total Intract thood Performing Prior Qees for Cost Qees for Cost Total TBD Cost C</td></th>	<td>Surveillance System - Adv Dev Capabilities-MIP In Millions) FY 2019 FY 2021 Cost To Cost To Complete TBD Classified : TBD State</td> <td>Surveillance System - Adv Dev Capabilities-MIP In Millions) FY 2019 FY 2021 FY 2021 FY 2021 FY 2021 Total In Millions) FY 2019 FY 2019 FY 2019 FY 2017 FY 2017 FY 2021 FY 2021 FY 2021 Total Intract thood Performing Prior Qees for Cost Qees for Cost Total TBD Cost C</td>	Surveillance System - Adv Dev Capabilities-MIP In Millions) FY 2019 FY 2021 Cost To Cost To Complete TBD Classified : TBD State	Surveillance System - Adv Dev Capabilities-MIP In Millions) FY 2019 FY 2021 FY 2021 FY 2021 FY 2021 Total In Millions) FY 2019 FY 2019 FY 2019 FY 2017 FY 2017 FY 2021 FY 2021 FY 2021 Total Intract thood Performing Prior Qees for Cost Qees for Cost Total TBD Cost C

Exhibit R-3, RDT&E	xhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army														Date: February 2020			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (NPE 0603766A / Tactical Electronic907 / TactSurveillance System - Adv DevCapabilitie					(Number actical Exp ities-MIP	r/ Name) bloitation C	Of Nation	al				
Test and Evaluation	(\$ in Milli	ons)		FY 2019		FY 2020		FY 2021 Base		FY 2 OC	2021 CO	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			
TENCAP Lab Tests, Exercises, Simulations	MIPR	Multiple : Multiple	1.810	0.396	Jan 2019	0.425	Jan 2020	0.400	Jan 2021	-		0.400	0.000	3.031	Continuing			
Test and Exercises - TITAN Space prototype development	TBD	Multiple : Multiple	-	-		-		0.880	Jan 2021	-		0.880	0.000	0.880	-			
Flyoff Test Support	TBD	TBD : TBD	-	-		-		1.750	Nov 2020	-		1.750	0.000	1.750	-			
LEO Tests	TBD	A-PNT / TENCAP : Multiple Locations	-	-		-		8.000	Mar 2021	-		8.000	0.000	8.000	-			
		Subtotal	1.810	0.396		0.425		11.030		-		11.030	0.000	13.661	N/A			
			Prior Years	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract			
		Project Cost Totals	94.387	35.667		37.490		194.775		-		194.775	0.000	362.319	N/A			

Remarks

The Low Earth Orbit (LEO) funding will be realigned from Program Element (PE) 1206308A Project FE5 to PE 0603766A Project 907 starting in FY21

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Army							Date:	February	2020		
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name)Project (Number/Name)PE 0603766A I Tactical Electronic907 I Tactical Exploitation Of NationalSurveillance System - Adv DevCapabilities-MIP									
Event Name	FY 2019	FY 20	20	FY 2021	FY 2022	FY	2023	F	Y 2024	F	Y 2025	
	1 2 3 4	1 2 3	4 1	2 3 4	1 2 3 4	1 2	3 4	1 2	3 4	1 2	3 4	
CORE Cross-Agency Advanced Development and Engineering	Development with Nat Int	el Community										
TENCAP General Officer Steering Group (TGOSG) - annual - gu	ides F1 1-25 POM											
TENCAP General Officer Steering Group (TGOSG) - annual - gu	ides FY22-26 POM	2										
TENCAP General Officer Steering Group (TGOSG) - annual - gu	ides FY23-27 POM			3								
TENCAP General Officer Steering Group (TGOSG) - annual - gu	ides FY24-28 POM				4							
TENCAP General Officer Steering Group (TGOSG) - annual - gu	ides FY25-29 POM					5						
TENCAP General Officer Steering Group (TGOSG) - annual - gu	ides FY26-30 POM											
TITAN Space prototype system												
ADV Advanced Development and Engineering												
AMDAS Next Studies/Antenna Design/Development												
AMDAS Next Ground Processor Development												
Air Vigilance Advanced Development and System prototype eff												
TRFE Prototype Development and System Integration Efforts					 							

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A										Date: Fe	ebruary	2020		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (IPE 0603766A / Tactical Electronic907 / TacSurveillance System - Adv DevCapabiliti								Number/Name) tical Exploitation Of National ies-MIP				
Event Name	FY 2019	FY 20	20	FY	2021	F	Y 2022		FY 202	3	FY :	2024	FY	2025
MDSS Sensor Fly-Off Planning	1 2 3 4	1 2 3	4	1 2	3 4	1 2	2 3 4	1	2 3	4	1 2	3 4	1 2	3 4
MDSS Sensor Fly-Off														
MDSS Sesor Improvements (LRR) Contract Award														
MDSS Integration Contract Award														
Low Earth Orbit prototyping, development and experimentation														

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febr	uary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program Eleme PE 0603766A <i>I Tacti</i> <i>Surveillance System</i>	nt (Numbe cal Electror - Adv Dev	r/Name) nic	Project (Number/Name) 907 I Tactical Exploitation Of Nationa Capabilities-MIP			
Sch	edule Details						
		St	art	E	nd		
Events	Q	uarter	Year	Quarter	Year		
CORE Cross-Agency Advanced Development and Engineering		1	2018	4	2025		
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY20)-24 POM	2	2018	2	2018		
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY21	-25 POM	2	2019	2	2019		
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY22	2-26 POM	2	2020	2	2020		
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23	3-27 POM	2	2021	2	2021		
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY24	-28 POM	2	2022	2	2022		
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY25	5-29 POM	2	2023	2	2023		
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY26	6-30 POM	2	2024	2	2024		
TITAN Space prototype system		1	2021	4	2025		
ADV Advanced Development and Engineering		2	2015	4	2025		
AMDAS Next Studies/Antenna Design/Development		1	2018	4	2023		
AMDAS Next Ground Processor Development		2	2020	4	2023		
Air Vigilance Advanced Development and System prototype efforts		3	2013	4	2025		
TRFE Prototype Development and System Integration Efforts		1	2018	3	2023		
MDSS Sensor Fly-Off Planning		1	2021	2	2021		
MDSS Sensor Fly-Off		2	2021	3	2021		
MDSS Sesor Improvements (LRR) Contract Award		1	2021	1	2022		
MDSS Integration Contract Award		4	2021	4	2022		
Low Earth Orbit prototyping, development and experimentation		1	2020	4	2025		

Exhibit R-2, RDT&E Budget Item	n Justificat	ion: PB 202	21 Army							Date: February 2020			
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0603774A I Night Vision Systems Advanced 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	
Total Program Element	-	7.072	200.791	24.316	-	24.316	22.282	16.958	72.311	34.349	Continuing	Continuing	
BQ5: Visual Augmentation System Advanced Development	-	0.000	193.280	13.986	-	13.986	11.843	11.819	67.534	30.314	Continuing	Continuing	
VT7: Soldier Maneuver Sensors - Adv Dev	-	7.072	6.028	7.565	-	7.565	7.675	3.141	2.779	2.037	Continuing	Continuing	
VT8: SOLDIER PRECISION TARGETING DEVICES - ADV DEV	-	0.000	1.483	2.765	-	2.765	2.764	1.998	1.998	1.998	Continuing	Continuing	

A. Mission Description and Budget Item Justification

This Program Element focuses on efforts to evaluate and integrate technologies and representative prototype systems that facilitate the development of Soldier-borne sensor devices transitioning from the laboratory to operational use. Efforts focus on proving out commonality across as broad a spectrum of users as possible to provide enhanced Soldier products, giving them superiority on the battlefield.

Project BQ5 (Visual Augmentation System-Advanced Development) focuses on developing the next generation vision system that provides the Soldier with the ability to "fight, win and survive, day and night, in a multi-domain environment now and tomorrow". Funded efforts will accelerate the development of components, algorithms and demonstrations in support of the next generation day/night vision system. Provide Rapid Target Acquisition capability with the Family of Weapon Sights-Individual and next generation End User Device (EUD), to include advanced EUD applications. The focus is to integrate external data sources and advanced processed imagery with overlay data display. This project supports efforts to evaluate and integrate technologies and representative prototype systems for development of Soldier sensor devices, transitioning from the Science and Technology (S&T) stage to operational use. This project includes associated costs for efforts associated with integration and interface of products on the Soldiers' head, body, and weapon. This is a priority of the Secretary's Close Combat Lethality Task Force. Funding in this project aligns with the Army's priorities in support of the National Defense Strategy.

Project VT7 (Soldier Maneuver Sensors-Advanced Development) focuses on developing integrated and enhanced solutions that provide the Soldier with the ability to "fight, win and survive, day and night, in a multi- domain environment now and tomorrow". Products include maneuver capabilities to detect, recognize and identify targets, and to provide target acquisition capabilities to mitigate threats prior to being engaged. The integration of higher performing multi-spectral sensors with smart processing will provide adjusted weapon sight reticles and leverage network connectivity for improved situational awareness/understanding. Additional capabilities include signature management and resiliency across the electromagnetic spectrum, integration of a modular design structure for target acquisition applications including support for wireless data transfer passive range determination, and mitigation of manned and unmanned threat sensor systems. This project supports efforts to evaluate and integrate technologies and representative prototype systems for development of Soldier sensor devices transitioning from the Science and Technology (S&T) stage to operational use. This project includes costs for efforts associated with development, certification, verification and validation of interface products into the Adaptive

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 I BA 4: Advanced	PE 0603774A I Night Vision Systems Advanced Development					
Component Development & Prototypes (ACD&P)						

Squad Architecture (ASA). This project also includes development of tools and emulators of ASA components. Funding in this project aligns with Army's priorities in support of the National Defense Strategy.

Project VT8 (Soldier Precision Targeting Devices - Advanced Development) focuses on developing component technologies and representative prototype systems for Soldier portable precision targeting devices to continue improvements to system performance while reducing size, weight, and power required by those systems. Efforts will improve the Soldier's ability to precisely locate and designate targets across a broader range of operating environments, including all weather conditions and GPScontested environments. Component technology development will precede integration into specific systems and will include improved Precision Azimuth and Vertical Angle Measurement (PAVAM) devices; solid-state, improved lasers for range finding/designation/marking; electro-optical sensors such as infrared, near-infrared, ultraviolet, and visible spectrum imagers; sensor and data fusion; laser designator spot detection and imaging; integration of advanced power management technologies. Funding in this project aligns with the Army's priorities in support of the National Defense Strategy.

B. Program Change Summary (\$ in Millions)	FY 2019	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	7.341	251.011	10.340	-	10.340
Current President's Budget	7.072	200.791	24.316	-	24.316
Total Adjustments	-0.269	-50.220	13.976	-	13.976
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-50.220			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-0.269	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	13.976	-	13.976

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4						am Elemen 74A / Night Developme	t (Number/ Vision Syste nt	Name) ems	Project (Number/Name) BQ5 I Visual Augmentation System Advanced 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
BQ5: Visual Augmentation System Advanced Development	-	0.000	193.280	13.986	-	13.986	11.843	11.819	67.534	30.314	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project focuses on developing the next generation vision system that provides the Soldier with the ability to "fight, win and survive, day and night, in a multi-domain environment now and tomorrow". Funded efforts will accelerate the development of components, algorithms and demonstrations in support of the next generation day/ night vision system. Provide Rapid Target Acquisition capability with the Family of Weapon Sights-Individual and next generation End User Device (EUD), to include advanced EUD applications. The focus is to integrate external data sources and advanced processed imagery with overlay data display. This project supports efforts to evaluate and integrate technologies and representative prototype systems for development of Soldier sensor devices, transitioning from the Science and Technology (S&T) stage to operational use. This project includes costs for efforts associated with movement of information and high level processing, integration, and interface of products with the Soldiers' head, body, weapon, and transportation. This is a priority of the Secretary's Close Combat Lethality Task Force. Funding in this project aligns with the Army's priorities in support of the National Defense Strategy. This project supports the Soldier Lethality Cross Functional Team.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2021	FY 2021
	FY 2019	FY 2020	Base	000	Total
<i>Title:</i> Heads Up Display (HUD)	-	184.503	13.986	-	13.986
Description: Integrated Visual Augmentation System (IVAS) HUD provides a first generation single platform for Soldier/Marines to fight, rehearse, and train in day and night that provides increased lethality, mobility, and situational awareness necessary to achieve overmatch against our current and future adversaries.					
FY 2020 Plans: Complete the development and technology improvements to IVAS.					
FY 2021 Base Plans: Develop technology improvements to the first generation IVAS system.					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decreased from \$193,280,000 in FY 2020 to \$13,986,000 in FY 2021 due to the transition from rapid prototyping to rapid fielding. Major initial development efforts for the first generation IVAS are completed in FY 2020.					
Title: FY 2020 SBIR/STTR Transfer	-	8.777	-	-	-

			Date: February 2020							
R-1 Program Ele PE 0603774A <i>I N</i> <i>Advanced Develo</i>	ment (Number light Vision Syst	Project (N BQ5 / Visu Advanced	lumber/Name) ual Augmentation System Development							
3. Accomplishments/Planned Programs (\$ in Millions)										
Description: Funding transferred in accordance with Title 15 USC 638										
nts/Planned Progr	ams Subtotals	; -	193.280	13.986	ò -	13.986				
Y 2021 FY 2021 OCO Total - 906.045 - 8.991	FY 2022 1,045.688 4.995	FY 2023 319.670 8.108	FY 2024 - 8.125	FY 2025 148.426 70.754	Cost To Complete Continuing Continuing	Total Cost Continuing Continuing				
	R-1 Program Ele PE 0603774A / N Advanced Develo ants/Planned Program Y 2021 FY 2021 OCO Total - 906.045 - 8.991	R-1 Program Element (Number PE 0603774A / Night Vision Syst Advanced Development ents/Planned Programs Subtotals Y 2021 FY 2021 OCO Total FY 2022 - 906.045 1,045.688 - 8.991 4.995	R-1 Program Element (Number/Name) PE 0603774A / Night Vision Systems Advanced Development FY 2019 FY 2019 ents/Planned Programs Subtotals - Y 2021 FY 2021 OCO Total FY 2022 1,045.688 - 906.045 - 8.991 4.995 8.108	R-1 Program Element (Number/Name) PE 0603774A / Night Vision Systems Advanced Development Project (N BQ5 / Visu Advanced FY 2019 FY 2020 FY 2019 FY 2020 Immunol Programs Subtotals - Y 2021 FY 2021 OCO Total - 906.045 - 8.991 4.995 8.108 8.125	Pate: Feb R-1 Program Element (Number/Name) PE 0603774A / Night Vision Systems Advanced Development Project (Number/Name) BQ5 / Visual Augment Advanced Development FY 2019 FY 2020 FY 2021 FY 2019 FY 2020 Base ents/Planned Programs Subtotals - 193.280 13.986 Y 2021 FY 2021 FY 2023 FY 2024 FY 2025 - 906.045 1,045.688 319.670 - 148.426 - 8.991 4.995 8.108 8.125 70.754	Date: February 2020R-1 Program Element (Number/Name) PE 0603774A I Night Vision Systems Advanced DevelopmentProject (Number/Name) BQ5 I Visual Augmentation Syste Advanced DevelopmentFY 2019FY 2019FY 2020FY 2021 BaseFY 2021 OCOImage: Subtotals-193.28013.986-Y 2021FY 2021 OCOFY 2022FY 2023 OCOFY 2024 Complete 148.426Cost To Complete ContinuingY 2021FY 2021 OCOFY 2022FY 2023 Complete 8.108FY 2024 8.125FY 2025 Complete Continuing				

This project utilizes competitively awarded contracts using best value source selection procedures.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Advanc	o gram Ele 3774A / N ed Develo	ement (N light Visio opment	umber/Na on System	Project BQ5 / V Advanc	Project (Number/Name) BQ5 I Visual Augmentation System Advanced Development				
Management Service	es (\$ in M	lillions)		FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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	-	-		8.777		-		-		-	0.000	8.777	-
		Subtotal	-	-		8.777		-		-		-	0.000	8.777	N/A
Product Development (\$ in Millions)				FY	2019	FY 2	2020	FY 2021 FY 2 Base O(2021 CO	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
Heads Up Display (HUD)	Option/ TBD	Various : Various	-	-		179.426	Mar 2020	10.000	Nov 2020	-		10.000	0.000	189.426	-
		Subtotal	-	-		179.426		10.000		-		10.000	0.000	189.426	N/A
Support (\$ in Millions	s)			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 Support	MIPR	NVESD : Fort Belvoir, Virginia 22060	-	-		5.077	Mar 2020	3.986	Nov 2020	-		3.986	0.000	9.063	-
		Subtotal	-	-		5.077		3.986		-		3.986	0.000	9.063	N/A
Prior Years				FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
	Project Cost Totals							13.986		-		13.986	0.000	207.266	N/A

Remarks

In FY 2020 Management Services and Test and Evaluation Cost Category Items will be funded from PE 0604710A Night Vision Systems - Engineering Development project BQ6 Visual Augmentation System - Engineering Development.

Exhibit R-4, RDT&E Schedule Profile: PB 2021								Date: February	2020		
Appropriation/Budget Activity 040 / 4		R-1 Program Element (Number/Name)Project (PE 0603774A / Night Vision SystemsBQ5 / Vision SystemsAdvanced DevelopmentAdvanced						(Number/Name) 'isual Augmentation System ed Development			
	FY 2019	FY 20	20	FY 20	21	FY 2022	FY 202	3	FY 2024	FY 2025	
Event Name	1 2 3 4	1 2 3	3 4	1 2 3	3 4	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	
Heads Up Display (HUD)	Development										
Technology Improvements to First Generation HUD				Development							
Second Generation HUD				Dereiopinent					Povoloomoot		
									Development		

hibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date:	February 2020	
propriation/Budget Activity 40 / 4	R-1 Program Element (N PE 0603774A <i>I Night Visic</i> Advanced Development	Project (Number BQ5 / Visual Augu Advanced Develo	Project (Number/Name) BQ5 I Visual Augmentation System Advanced Development		
	Schedule Details				
		Oto #		Final	
Events	Quarte	Start r Year	· Quarter	End r Year	
Events Heads Up Display (HUD)	Quarte	Start r Year 2018	- Quarter	End r Year 2020	
Events Heads Up Display (HUD) Technology Improvements to First Generation HUD	Quarte 4 1	Start r Year 2018 2021	- Quarter 3 4 1 4	End r Year 2020 2023	

Exhibit R-2A, RDT&E Project Ju			Date: Febr	uary 2020								
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060377 Advanced	am Elemen 74A / Night N Developme	t (Number/ /ision Syste nt	Number/Name) dier Maneuver Sensors - Adv 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
VT7: Soldier Maneuver Sensors - Adv Dev	-	7.072	6.028	7.565	-	7.565	7.675	3.141	2.779	2.037	Continuing	Continuing
Quantity of RDT&E Articles	ntity of RDT&E Articles						-	-	-	-		

A. Mission Description and Budget Item Justification

This project focuses on developing integrated and enhanced solutions that provide the Soldier with the ability to "fight, win and survive, day and night, in a multi- domain environment now and tomorrow". Products include maneuver capabilities to detect, recognize and identify targets, and to provide target acquisition capabilities to mitigate threats prior to being engaged. The integration of higher performing multi-spectral sensors with smart processing will provide adjusted weapon sight reticles and leverage network connectivity for improved situational awareness/understanding. Additional capabilities include signature management and resiliency across the electromagnetic spectrum, integration of a modular design structure for target acquisition applications including support for wireless data transfer passive range determination, and mitigation of manned and unmanned threat sensor systems. This project supports efforts to evaluate and integrate technologies and representative prototype systems for development of Soldier sensor devices transitioning from the Science and Technology (S&T) stage to operational use. This project includes costs for efforts associated with development, certification, verification and validation of interface products into the Adaptive Squad Architecture (ASA). This project also includes development of tools and emulators of ASA components. Funding in this project aligns with Army's priorities in support of the National Defense Strategy.

B. Accomplishments/Planned Programs (\$ in Millions)	EV 0040		FY 2021	FY 2021	FY 2021
	FY 2019	FY 2020	Base	000	Iotai
<i>Title:</i> Soldier Enhanced Sensing Capabilities	5.803	1.912	1.490	-	1.490
Description: Soldier Enhanced Sensing Capabilities provides the next generation vision capabilities for day and night that will reduce the Soldier's burden and allow hands free operation. Soldier Enhanced Sensing Capabilities will provide automatic adjustment of imagery and matched sensor fields of view. This effort will provide day/night Rapid Target Acquisition (RTA) capability by interfacing with Family of Weapon Sights-Individual (FWS-I), day/night data display for the Soldier Network Warrior End User Device/Computer (EUD), and ability to send/receive data to the EUD to support advanced EUD applications to process the sensor video, integrate it with external data sources, and produced advanced processed imagery with overlay data display. This effort will consider Integrated Vision Augmentation System (IVAS) successes and explore an integrated digital, low profile, conformal day/night display. Prototyping will provide multiple knowledge point events to gauge vendor progress and capability to the force. This effort also includes continued digital Near-infrared (NIR) sensor development for potentially replace the aging fleet of Night Vision Devices.					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020								
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/ PE 0603774A I Night Vision Syste Advanced Development	' Name) ems	Project (Number/Name) VT7 / Soldier Maneuver Sensors - Adv Dev						
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total			
For FY 2020, in addition to continuing unfinished work initiated in FY expected in the Enhanced Night Vision Goggle-Binocular (ENVG-B) Augmented Reality (AR) and Machine Learning (ML) into the goggle anticipated. Work is continuing on a more robust, harder to detect at of this 256-bit encryption solution will be performed on all Soldier Ma of record in an effort to establish a Intra Soldier Wireless (ISW) netw documented (via ICDs) and available for use on any program that de network.									
<i>FY 2021 Base Plans:</i> For FY 2021, in addition to continuing unfinished work initiated in FY expected in the Family of Weapon Sights and Small Tactical Optical from an Intra Soldier Wireless (ISW) 128-bit encryption to a 256-bit certified 256-bit solution will be evaluated and appropriately acted up Targeting, ENVG-B employs Augmented Reality (AR) and Machine I expected to solidify and enhance the supply of organic light emitting while work continues on advanced displays including waveguides an in multi-spectral devices that provide Soldiers capabilities beyond ne	⁷ 2020, integration and enhancements are Rifle Mounted programs of record. Migration encryption solution and ultimately to an NSA oon for all Soldier Maneuver and Precision Learning (ML) capabilities. Investments are diodes for existing and emerging programs and projection systems. Investments continue ear peer adversaries.								
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2020 to FY 2021 slight decrease as component technologies hav resources	ve matured and synchronized with IVAS								
Title: Target Acquisition Laser Capabilities		1.269	2.272	2.701	-	2.701			
Description: Target Acquisition Laser Capabilities develops modula prototype systems to support target acquisition for pointing, ranging, of threat sensors. This effort will develop a common laser range findic capabilities based on Squad member Table of Organization and Equideveloped with full documentation, including specifications and interfusion the Adaptive Soldier Architecture. This effort develops target moving towards a covert target handoff, pointing and range finding consolidier laser event recording and laser warning devices.	ar laser components and representative target hand-off, detection and mitigation ing core for fire control and other laser upment (TOE) position. Modules will be face control documents such that they t handoff capabilities that are less detectable apability. This effort also includes individual								
FY 2020 Plans:									

PE 0603774A: *Night Vision Systems Advanced Developmen...* Army

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020						
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/ PE 0603774A / Night Vision Syste Advanced Development	Name) ems	Project (Number/Name) VT7 / Soldier Maneuver Sensors - Adv De				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	
Continue development and integration of modular target acquisition laser com	iponents.						
<i>FY 2021 Base Plans:</i> For FY 2021, resources will be used for development of modular laser compoleverage interface control documents and the Adaptive Squad Architecture. Intra-Soldier Wireless and an Intelligent/Powered Rail will support a modular starget acquisition, pointing, ranging, and target hand-off.							
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2020 to FY 2021 increase in required funding as laser capabilities are inter Development.	grated into Advanced Sensor						
Title: Advanced Sensor Development		-	1.571	2.734	-	2.734	
Description: Advanced Sensor Development is the next generation weapon in Next Generation Squad Weapons (NGSW). The increased Advanced Sensor include: wireless remote weapon sight viewing compatibility with the emerging Vision Goggle - Binocular (ENVG-B) and Integrated Vision Augmentation System Rapid Target Acquisition (RTA) capability; wireless interface with the future Sexchange Mission Command information; day and night capabilities to image interrogation; laser range finding; target handoff with coded sources; adjusted recognition capabilities at tactical ranges.	target acquisition system for use on Development all digital capabilities g goggle solutions (Enhanced Night tem (IVAS)) to provide a heads up oldier processing component to in multiple spectral bands; target and displaced reticule; and facial						
<i>FY 2020 Plans:</i> FY 2020 should complete the development of laser components including the (SWIR) laser that is planned for incorporation into the Advanced Sensor Developmentialy used for aiming, target handoff, target illumination and ranging.	"ATOM" Short Wave Infra-Red elopment. The ATOM lasers						
<i>FY 2021 Base Plans:</i> Plans to integrate advanced capabilities, employ system engineering principa Architecture and refine capability emergence from lab to Program Manageme	ls in support of the Adaptive Squad nt responsibility.						
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2020 to FY 2021 increase in required funding as IVAS matured some com schedule.							
Title: Adaptive Squad Architecture (ASA) Tools		-	-	0.640	-	0.640	

PE 0603774A: *Night Vision Systems Advanced Developmen...* Army

Exhibit R-2A, RDT&E Project Justif	ication: PB	Date: February 2020									
Appropriation/Budget Activity 2040 / 4				R-1 Pi PE 06 <i>Advan</i>	rogram Eler 03774A / Nig ced Develop	nent (Numbe ght Vision Sys oment	er/Name) stems	Project (N VT7 / Sold	Number/Name) dier Maneuver Sensors - Adv Dev		
B. Accomplishments/Planned Prog	rams (\$ in N	<u>lillions)</u>					FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: This project contains to integration effort. This project consid power efficiencies. This project deve Gen Squad Weapon power / intelliger verification of evolving Intra-Soldier W weapon enablers.	11										
FY 2021 Base Plans: Strategically plan for Soldier Integration	on Faciltiy ar	nd ASA supp	port, NGSW	integration a	and ISW grov	wth.					
FY 2020 to FY 2021 Increase/Decre The ASA is established to identify and	ase Statem d capture res	e <i>nt:</i> sources requ	uired for end	uring suppor	t to the ASA	mission.					
<i>Title:</i> FY 2020 SBIR/STTR Transfer							-	0.273	-	-	-
Description: Funding transferred in a	accordance v	vith Title 15	USC 638								
FY 2020 Plans: Funding transferred in accordance wi	th Title 15 U	SC 638									
FY 2020 to FY 2021 Increase/Decree Funding transferred in accordance wi	ase Statem th Title 15 U	e nt: SC 638									
			Accomplis	hments/Plar	nned Progra	ams Subtota	l s 7.072	6.028	7.565	5 -	7.565
C. Other Program Funding Summa	ry (\$ in Milli	ons <u>)</u>									
			<u>FY 2021</u>	<u>FY 2021</u>	FY 2021					Cost To	
Line Item	<u>FY 2019</u>	<u>FY 2020</u>	Base	000	<u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Complete</u>	Total Cost
L67: Soldier Night Vision Devices	56.793	35.060	14.653	-	14.653	9.231	12.519	17.161	17.163	Continuing	Continuing
• K36400: Helmet Mounted	112.251	50.632	207.626	-	207.626	245.012	6.436	318.684	-	Continuing	Continuing
Enhanced Vision Devices											
• K22002: FWS-INDIVIDUAL	/1.526	//.718	84.792	Continuing	Continuing						
• K22003: FWS-CREW SERVED	22.698	-	31.861	-	31.861	/8.066	/8.193	11.228	64.934	Continuing	Continuing
• K22004: FWS-SNIPER	-	-	2.569	-	2.569	11.336	18.843	19.767	11.489	Continuing	Continuing
Locator Systems	32.704	24.354	13.704	0.643	14.347	20.817	23.752	21.663	49.820	Continuing	Continuing

PE 0603774A: *Night Vision Systems Advanced Developmen...* Army

Exhibit R-2A, RDT&E Project Justif	ication: PB	2021 Army								Date: February 2020			
Appropriation/Budget Activity				R-1 Pi	rogram Elei	nent (Numb	er/Name)	Project (N	Number/Na	me)			
2040 / 4				PE 06	03774A I Ni	ght Vision Sy	rstems	VT7 / Solo	dier Maneu	ver Sensors	- Adv Dev		
				Advan	ced Develo	oment							
C. Other Program Funding Summa	ry (\$ in Milli	ons <u>)</u>											
		-	FY 2021	FY 2021	<u>FY 2021</u>					Cost To			
Line Item	FY 2019	<u>FY 2020</u>	Base	000	Total	FY 2022	FY 2023	<u>FY 2024</u>	FY 2025	Complete	Total Cost		
 K35110: Small Tactical 	16.990	22.623	13.954	-	13.954	21.355	26.060	29.315	3.131	Continuing	Continuing		
Optical Rifle Mounted MLRF													
• K36402: IVAS/Heads Up Display	-	-	906.045	-	906.045	1,045.688	319.670	-	148.426	Continuing	Continuing		
 BQ5: Visual Augmentation 	-	193.280	13.986	-	13.986	11.843	11.819	67.534	30.314	Continuing	Continuing		
System Advanced Development													
 BQ6: Visual Augmentation 	-	63.200	8.991	-	8.991	4.995	8.108	8.125	70.754	Continuing	Continuing		
System Eng Dev													
Remarks													

D. Acquisition Strategy

The various developmental programs in this Project continue to exercise competitively awarded contracts using best value source selection procedures.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	У								Date:	February	/ 2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Advance	ogram Ele 3774A / N ced Develo	e ment (N Night Visi opment	lumber/N on Systen	ame) ns	Project VT7 / S	(Numbe oldier Ma	r/Name) neuver S	ensors - A	\dv Dev
Management Service	es (\$ in M	lillions)		FY	2019	FY	2020	FY : Ba	2021 ase	FY 2	2021 CO	21 FY 2021 D Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	Various : Various	-	0.406	Nov 2018	0.556	Dec 2019	0.394	Nov 2020	-		0.394	Continuing	Continuing	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.273		-		-		-	0.000	0.273	-
	4	Subtotal	-	0.406		0.829		0.394		-		0.394	Continuing	Continuing	N/A
Product Developmer	roduct Development (\$ in Millions)			FY	2019	FY 2020		FY : Ba	2021 ase	FY 2	2021 CO	21 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
Soldier Enhanced Sensing Capabilities	MIPR	NVESD : FT BELVOIR, VA	-	5.262	Dec 2018	1.949	Feb 2020	1.490	Nov 2020	-		1.490	Continuing	Continuing	-
Target Acquisition Laser Capabilities	MIPR	NVESD : FT BELVOIR, VA	-	1.023	Jan 2019	2.309	Jan 2020	2.353	Nov 2020	-		2.353	Continuing	Continuing	-
Advanced Sensor Development	TBD	TBD : TBD	-	-		0.336	Feb 2020	2.040	Nov 2020	-		2.040	Continuing	Continuing	-
Adaptive Squad Architecture (ASA) Tools	TBD	TBD : TBD	-	-		-		0.640	Nov 2020	-		0.640	Continuing	Continuing	-
		Subtotal	-	6.285		4.594		6.523		-		6.523	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY	2019	FY	2020	FY : Ba	2021 ase	FY 2	2021 CO	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 Support	MIPR	NVESD : FT BELVOIR, VA	-	0.381	Nov 2018	0.605	Jan 2020	0.648	Nov 2020	-		0.648	Continuing	Continuing	-
		Subtotal	-	0.381		0.605		0.648		-		0.648	Continuing	Continuing	N/A
			Prior Years	FY	2019	FY	2020	FY : Ba	2021 ase	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	7.072		6.028		7.565		-		7.565	Continuing	Continuing	N/A

PE 0603774A: *Night Vision Systems Advanced Developmen...* Army

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	2021 Arm	у					Date:	February	2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Ele PE 0603774A / I Advanced Devel	ement (Number/Na Night Vision System opment	ame) 15	Project (Number/Name) VT7 / Soldier Maneuver Sensors - Adv Dev						
	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2 OC	021 O	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Develop										

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army									Da	Date: February 2020															
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (Number/Name)PE 0603774A I Night Vision Systems Advanced DevelopmentVT7 I Soldier Maneuver Sensors - Adv I										dv Dev	/								
Event Name	FY 2019 FY 20				2020	020 FY 2021 FY 2022						F	FY 2023 FY 2024				FY 2	2025	٦						
Event Name	1	2	3 4	1	2	3 4	1	2	3	4	1	2	3 4	1	1	2 3	6 4	1	2	3	4	1	2	3 4	
Advanced Sensor Development	Devel	opmeni	t																						
Advanced Sensor Development MS B															M	1 S B									
Target Acquisition Laser Capabilities	Devel	opment	t																						
Soldier Enhanced Sensing Capabilities																									
Adaptive Squad Architecture (ASA) Tools	Devel	opmeni	t.																						
							Deve	lopmen	t																

hibit R-4A, RDT&E Schedule Details: PB 2021 Army							
ogram Element (Numbe 3774A I Night Vision Sys ed Development	er/Name) stems	Project (Number/Name) VT7 / Soldier Maneuver Sensors - Adv De					
Details							
St	art	End					
Quarter	Year	Quarter	Year				
1	2019	2	2023				
2	2023	2	2023				
1	2019	4	2025				
1	2019	4	2025				
1	2021	4	2025				
	Details Ogram Element (Number 3774A I Night Vision System 3774A I Night Vision System State Details Quarter 1 2 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Ogram Element (Number/Name)3774A I Night Vision Systems3774A I Night Vision Systemsced DevelopmentDetailsQuarterYear122212019120191120191120191201912021	Date: February Date: FebruaryOgram Element (Number/Name) 3774A / Night Vision Systems wed DevelopmentProject (Number/Name VT7 / Soldier Maneuv VT7 / Soldier ManeuvDetailsEQuarterYearQuarter120192220232120194120194120194				

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020				
Appropriation/Budget Activity 2040 / 4						am Element 74A / Night \ Developme	t (Number/ /ision Systent	lumber/Name) _DIER PRECISION TARGETING - ADV 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		
VT8: SOLDIER PRECISION TARGETING DEVICES - ADV DEV	-	0.000	1.483	2.765	-	2.765	2.764	1.998	1.998	1.998	Continuing	Continuing		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				
A. Mission Description and Bud	get Item J	ustification												

This project focuses on developing component technologies and representative prototype systems for Soldier portable precision targeting devices to continue improvements to system performance while reducing size, weight, and power required by those systems. Efforts will improve the Soldier's ability to precisely locate and designate targets across a broader range of operating environments, including all weather conditions and GPS-contested environments. Component technology development will precede integration into specific systems and will include improved Precision Azimuth and Vertical Angle Measurement (PAVAM) devices; solid-state, improved lasers for range finding/designation/marking; electro-optical sensors such as infrared, near-infrared, ultra-violet, and visible spectrum imagers; sensor and data fusion; laser designator spot detection and imaging; integration of advanced power management technologies. Funding in this project aligns with 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: Precision Pointing and Navigation Component Development	-	1.416	2.765	-	2.765
Description: This project supports development of advanced components and prototype systems for Soldier- borne precision targeting devices. Dismounted Soldiers will have the capability to rapidly acquire, accurately locate, positively identify, and precisely designate targets and battlefield threats 24/7, across a broader range of operating environments such as in all weather conditions, and in GPS-contested conditions.					
FY 2020 Plans: FY 2020 resources will be used to integrate Intra-Soldier Wireless capabilities into Soldier Precision Targeting Devices (SPTD) Fires portfolio. In addition, as the Army begins to introduce M-Code, the more robust north finding solution will be integrated into the Fires SPTD products.					
<i>FY 2021 Base Plans:</i> FY 2021 resources will be used for development of component technologies and initial sub-system integration for Precision Azimuth and Vertical Angle Measurement (PAVAM) devices with reduced size, weight, and power. Additionally, FY 2021 resources will continue integration of M-Code into Dismounted Fires systems to improve operational capabilities in a GPS-contested environment.					
FY 2020 to FY 2021 Increase/Decrease Statement:					

PE 0603774A: *Night Vision Systems Advanced Developmen...* Army
Exhibit R-2A, RDT&E Project Justi		Date: February 2020										
Appropriation/Budget Activity 2040 / 4				R-1 Pr PE 060 <i>Advan</i>	ogram Eler 03774A / Nig ced Develop	nent (Numb ght Vision Sy oment	er/Name) stems	Project (Number/Name) VT8 / SOLDIER PRECISION TARGETING DEVICES - ADV DEV				
B. Accomplishments/Planned Pro	grams (\$ in N	<u>/lillions)</u>					FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	
FY 2020 to FY 2021 increase in requ	uired funding	to provide G	PS denied c	apability.								
Title: FY 2020 SBIR/STTR Transfer							-	0.067	-	-	-	
Description: Funding transferred in												
FY 2020 Plans: Funding transferred in accordance w	vith Title 15 U	SC 638										
FY 2020 to FY 2021 Increase/Decre Funding transferred in accordance w	ease Statem vith Title 15 U	ent: SC 638										
			Accomplisi	nments/Plar	nned Progra	ams Subtota	ls -	1.483	2.765	-	2.765	
C. Other Program Funding Summa	ary (\$ in Milli	<u>ons)</u>	EV 0004	EV 0004	EV 0004					0 a a 4 T a		
Line Itom	EV 2040	EV 2020	<u>FY 2021</u> Base	<u>FT 2021</u>	<u>FY 2021</u> Total	EV 2022	EV 2022	EV 2024	EV 2025	<u>Complete</u>	Total Cost	
LTG: Dismounted Fire Support	14.761	<u> </u>	0.000	-	0.000	<u></u>	<u>FT 2023</u> -	<u>F I 2024</u> -	<u> </u>	0.000	14.761	
Laser Targeting Systems L79: Joint Effects Torracting Systems (JETS)	10.080	6.410	5.566	-	5.566	5.603	5.035	5.604	6.004	0.000	44.302	
K32101: JOINT EFFECTS	66.574	25.330	69.641	-	69.641	67.932	69.629	69.624	69.623	0.000	438.353	
• KA3100: Mod Of In- Svc Equip (LLDR)	24.833	6.044	0.000	-	0.000	-	-	-	-	0.000	30.877	

<u>Remarks</u>

D. Acquisition Strategy

The various developmental programs in this project continue to exercise competitively awarded contracts using best value source selection procedures.

PE 0603774A: *Night Vision Systems Advanced Developmen...* Army

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budg 2040 / 4	et Activity	1				R-1 Pro PE 060 <i>Advanc</i>	ogram Ele 3774A / N ed Develo	ement (N light Visio opment	umber/Na on System	a me) Is	Project VT8 / S DEVICI	: (Number/Name) OLDIER PRECISION TARGETING ES - ADV DEV			
Management Servic	es (\$ in N	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	PM SSL : Ft. Belvoir, VA 22060	-	-		0.023	Jan 2020	0.023	Nov 2020	-		0.023	Continuing	Continuing	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.067		-		-		-	0.000	0.067	-
		Subtotal	-	-		0.090		0.023		-		0.023	Continuing	Continuing	N/A
Product Development (\$ in Millions)			FY 2019		FY 2	FY 2020		FY 2021 Base		2021 CO	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
Precision Pointing and Navigation	C/FFP	Various : Various	-	-		1.372	Feb 2020	2.715	Dec 2020	-		2.715	Continuing	Continuing	-
		Subtotal	-	-		1.372		2.715		-		2.715	Continuing	Continuing	N/A
Support (\$ in Millior	ıs)			FY	2019	FY 2	2020	FY 2021		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 Support	MIPR	NVESD : Ft. Belvoir, VA 22060	-	-		0.021	Jan 2020	0.027	Nov 2020	-		0.027	Continuing	Continuing	-
		Subtotal	-	-		0.021		0.027		-		0.027	Continuing	Continuing	N/A
			Prior Years	FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals -			-		1.483		2.765		-		2.765	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 202									Date: Februar	/ 2020					
Appropriation/Budget Activity 2040 / 4	ppropriation/Budget Activity 040 / 4					R-1 Program Element (Number/Name)ProjectPE 0603774A / Night Vision SystemsVT8 / SCAdvanced DevelopmentDEVICE							(Number/Name) DLDIER PRECISION TARGETING 'S - ADV DEV		
				1		1		1							
Event Name		FY 20	019	FY :	2020	FY 2	021	FY	2022	FY 20	023	FY 2024	FY 2	2025	
Precision Pointing and Navigation Development	1	2	3 4	1 2	3 4	1 2	3 4	1 2	3 4	1 2 3	3 4	1 2 3 4	1 2	3 4	

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army Date: February 2020											
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (N PE 0603774A / Night Vis Advanced Development	R-1 Program Element (Number/Name) PE 0603774A <i>I Night Vision Systems</i> <i>Advanced Development</i>									
	Schedule Details										
		Start	E	nd							
Events	Quart	er Yea	r Quarter	Year							
Precision Pointing and Navigation Development	3	202	0 4	2025							

Exhibit R-2, RDT&E Budget Item	n Justificat	i on: PB 202	21 Army							Date: February 2020			
Appropriation/Budget Activity 040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)				anced	R-1 Program Element (Number/Name) PE 0603779A / Environmental Quality Technology - Dem/Val								
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost	
Total Program Element	-	14.190	19.561	13.387	-	13.387	12.166	13.490	10.950	10.772	0.000	94.516	
035: National Defense Cntr For Enviro Excellence	-	4.685	6.484	5.272	-	5.272	5.374	6.508	6.644	6.712	0.000	41.679	
E21: Environmental Quality Technology Dem/Val	-	9.505	13.077	8.115	-	8.115	6.792	6.982	4.306	4.060	0.000	52.837	

A. Mission Description and Budget Item Justification

There is broad potential application for environmental quality technology (EQT) to be applied to multiple Army weapon systems and installations. However, technology must be demonstrated and validated (total ownership cost and performance data identified) before potential users will consider exploiting it. This Program Element (PE) includes Projects focused on validating the general military utility or cost reduction potential of technology when applied to different types of infrastructure, military equipment or techniques. It may include validations and proof-of-principle demonstrations in field exercises to evaluate upgrades or provide new operational capabilities. The validation of technologies will be in as realistic an operating environment as possible to assess performance or cost reduction potential. EQT demonstration/ validation is systemic and applicable across Department of Army sites and installation problems (e.g. unexploded ordnance detection and discrimination). This PE supports the Army's top modernization priorities by addressing potential obsolescence of legacy materials and current and emerging impacts on human health and the environment. All work is endorsed by potential users and supported by a state-of-the-art assessment to determine when the technology can transition to the user for implementation.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	14.731	15.132	16.263	-	16.263
Current President's Budget	14.190	19.561	13.387	-	13.387
Total Adjustments	-0.541	4.429	-2.876	-	-2.876
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-3.571			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	8.000			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-0.541	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	-2.876	-	-2.876
Congressional Add Details (\$ in Millions, and Include	es General Redu	<u>uctions)</u>			FY 2019 FY 2020
Project: 035: National Defense Cntr For Enviro Exceller	ice				

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 20	20
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603779A <i>I Environmental Quality Technology - Dem</i>	/Val	
Congressional Add Details (\$ in Millions, and Includes General Rec	ductions)	FY 2019	FY 2020
Congressional Add: Program increase - biopolymers for military infr	astructure	-	3.000
	Congressional Add Subtotals for Project:	035 -	3.000
Project: E21: Environmental Quality Technology Dem/Val			
Congressional Add: Environmental quality technology demonstration Biopolymers	n and validation: Congressional Add - Protective Coatings/	-	5.000
	Congressional Add Subtotals for Project:	E21 -	5.000
	Congressional Add Totals for all Proj	ects -	8.000

Exhibit R-2A, RDT&E Project Ju				Date: Febr	uary 2020							
Appropriation/Budget Activity 2040 / 4	riation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) PE 0603779A / Environmental Quality 035 / National Defense Cntr For E Technology - Dem/Val Excellence						inviro					
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
035: National Defense Cntr For Enviro Excellence	-	4.685	6.484	5.272	-	5.272	5.374	6.508	6.644	6.712	0.000	41.679
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The National Defense Center for Environmental Excellence (NDCEE) was established by Congress in 1990 with a directive to "serve as a national leadership organization to address high priority environmental problems for the Department of Defense (DoD), other government organizations, and the industrial community." The NDCEE Program is a national resource for developing and disseminating advanced environmental technologies. The NDCEE is used to: demonstrate environmentally acceptable technology to industry; validate new technology prior to transferring that technology; and assist in the training of potential users as part of that technology transfer process. The NDCEE is a DoD resource for environmental quality management and technology validation. This Project is managed by the Army on behalf of the Assistant Secretary of Defense for Sustainment. In May 2008, the Project name was re-designated from the National Defense Center for Environmental Excellence to the National Defense Center for Energy and Environment to ensure that the Center's mission recognizes and addresses the strategic interdependence of energy and environmental technology requirements within an overall sustainability framework in support of our installations, weapons systems and war fighters. This name change also directly supports the DoD's proactive implementation of Executive Order 13423, "Strengthening Federal Environmental, Energy and Transportation Management."

The United States (U.S.) Army's broadly encompassing and growing mobile, personal and stationary advanced energy technology requirements include infrastructure, alternative and synthetic fuels, surety, renewables, storage, distribution, advanced power, micro-grids, transportation, systems integration and others. Further, to train as we fight, validated energy and environmental technologies need to be available and implemented at Army installations. The NDCEE will continue to demonstrate, validate, and transfer these technologies supporting our integrated environment, safety, occupational health and energy objectives in consideration of mission, readiness, innovation, lethality and modernization.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<i>Title:</i> Conduct demonstration/validation of environmentally acceptable technologies that enhance military readiness and reduce production, operating, and/or disposal costs.	4.495	3.212	5.072
Description: Supports the demonstration and validation of mature (BA4) environment, safety, occupational health, and energy technologies that support the Army's Environmental Quality Technology mission. The objective is to invest in innovative technologies that support military mission/readiness, employ a high degree of technical fidelity, have a high potential for transition success, and align with modernization goals.			
FY 2020 Plans: Will conduct demonstration/validation of environment, safety, occupational health, and energy technologies that support military mission/readiness, employ a high degree of technical fidelity, have a high potential for transition success, and align with			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	1		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A <i>I Environmental Quality</i> <i>Technology - Dem/Val</i>	Proje 035 / Excell	ject (Number/Name) I National Defense Cntr For Enviro ellence				
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2019	FY 2020	FY 2021		
modernization goals. Will conduct project selection process for poter NDCEE project selection committee and approved by the NDCEE Le	ntial FY 2021 new starts. Technologies will be selected b ead Agent.	by the					
FY 2021 Plans: Will conduct demonstration/validation of environment, safety, occupa military mission/readiness, employ a high degree of technical fidelity modernization goals. Will conduct project selection process for poter NDCEE project selection committee and approved by the NDCEE Le	ational health, and energy technologies that support , have a high potential for transition success, and align v ntial FY 2022 new starts. Technologies will be selected b ead Agent.	vith by the					
FY 2020 to FY 2021 Increase/Decrease Statement: Increase is due to programmatic economic factors and success of F [*] program.	Y19 projects and increased recognition and value of the						
<i>Title:</i> NDCEE Government program management during contract ne technology transfer.	egotiations and during project formulation, execution, and	d	0.190	0.119	0.200		
Description: Funds the NDCEE Government program management cultivation and identification, screening, selection, execution, and tec	t during comprehensive NDCEE lifecycle, including proje chnology transition.	ect					
FY 2020 Plans: Will fund the NDCEE program management during comprehensive N identification, screening, selection, execution, reporting, and technol closeouts, travel to conduct program management oversight, and pro-	NDCEE lifecycle, including project cultivation and ogy transfer. Includes contracting office support for contracting contraction to DoD stakeholders.	tract					
FY 2021 Plans: Will fund the NDCEE program management during comprehensive N identification, screening, selection, execution, reporting, and technol closeouts, travel to conduct program management oversight, and program management oversight.	NDCEE lifecycle, including project cultivation and ogy transfer. Includes contracting office support for contracting contraction to DoD stakeholders.	tract					
FY 2020 to FY 2021 Increase/Decrease Statement: Programmatic Economic Factors.							
Title: FY 2020 SBIR/STTR Transfer			-	0.153	-		
Description: Funding transferred in accordance with Title 15 USC	638						
FY 2020 Plans:							

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army				Date:	ebruary 2020)
Appropriation/Budget ActivityF2040 / 4F7	R-1 Program Element (Number/ PE 0603779A <i>I Environmental Qu</i> Technology - Dem/Val	ct (Number/ National Def ence	Name) ense Cntr For	Enviro		
B. Accomplishments/Planned Programs (\$ in Millions)				FY 2019	FY 2020	FY 2021
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638						
٩	Accomplishments/Planned Prog	grams Sub	totals	4.685	3.484	5.272
		FY 2019	FY 20	020		
Congressional Add: Program increase - biopolymers for military infrastructure		-	3	.000		
FY 2020 Plans: Program increase - biopolymers for military infrastructure						
	Congressional Adds Subtotals	-	3	.000		

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

N/A

<u>Remarks</u>

D. Acquisition Strategy

The NDCEE is a national asset focused on DoD applications that include technology transfer to appropriate DoD transition partners. The management strategy for the NDCEE ensures that all projects have a potential multi-service benefit and have a high potential for transition success. At the strategic level, the NDCEE Executive Advisory Board (EAB) is chaired by the DoD NDCEE Lead Agent on behalf of the Assistant Secretary of Defense for Sustainment and is representative of the services and DoD. The EAB and the Program Director are supported by the NDCEE Technical Advisory Group (TAG) to help ensure that NDCEE investments are maximized across DoD and the Services. At the tactical level, the three Focus Groups (environment, safety/occupational health, and energy) cultivate and recommend priority projects to the TAG and Project Selection Committee for funding. Transition Partners ensure that NDCEE's investments are carried forward in the next phases of the Research Development Test and Evaluation process, as identified in each funded project's Technology Transition Agreement.

NDCEE projects enable readiness for the Services under increasingly complex and demanding scenarios. The interdependency of national security with energy supply and costs, water supply and costs, environmental resiliency, and human health and safety are clear and NDCEE projects provide forward-looking solutions to these challenges. Failure to further fund and validate promising technologies that are at the mature or Commercial-off-the-Shelf stage, would result in lost modernization opportunities and validation before they go into a military environment. These initiatives need to be carried forward into an operational/realistic testing environment so that they can support mission readiness and training when ultimately fielded to the Services.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	Appropriation/Budget Activity 2040 / 4						o gram Ele 3779A / E logy - Der	e ment (N Environme m/Val	umber/Na ental Qual	ame) ^{lity}	Project (Number/Name) 035 I National Defense Cntr For Enviro Excellence				
Management Service	es (\$ in M	illions)		FY 2019		FY 2	2020	FY 2 Ba	2021 Ise	FY 2 O(2021 CO	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	AEC : San Antonio, TX	24.916	0.190	Nov 2018	0.119	Nov 2018	0.200	Nov 2018	-		0.200	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.153		-		-		-	0.000	0.153	-
		Subtotal	24.916	0.190		0.272		0.200		-		0.200	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ons)	ſ	FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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 Testing and Evaluation	Various	Various. : Various	35.624	4.495	Nov 2018	6.212	Nov 2018	5.072	Nov 2018	-		5.072	Continuing	Continuing	Continuing
		Subtotal	35.624	4.495		6.212		5.072		-		5.072	Continuing	Continuing	N/A
			Prior Years	FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals 60.540						6.484		5.272		-		5.272	Continuing	Continuing	N/A

Remarks

Appropriation/Budget Activity Project (Number/Name) Spriper (Number/Name) 2040 / 4 Project (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Spriper (Number/Name) Event Name FY 2020 FY 2021 FY 2022 FY 2024 <	Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	vrmy				Date: February 2020								
	Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 <i>Techr</i>	Program Elemen 603779A / Enviro nology - Dem/Val	n t (Number/Name onmental Quality I	e)	Project (N 035 / Natio Excellence	lumber/Name) onal Defense Cnt e	tr For Enviro				
NDCEE Management and Operations (Enduring) V <thv< th=""> V<!--</th--><th>Event Name</th><th>FY 2019</th><th>FY 202</th><th>20</th><th>FY 2021</th><th>FY 2022</th><th></th><th>FY 2023</th><th>FY 2024</th><th>FY 2025</th></thv<>	Event Name	FY 2019	FY 202	20	FY 2021	FY 2022		FY 2023	FY 2024	FY 2025				
NDCEE Env, Safety, Occ Health, and Energy Technology Dem ^A	NDCEE Management and Operations (Enduring)	1 <u>Z</u> J 4	1 2 3	4	1 2 3 4	1 Z J 4		2 3 4	1 Z J 4	1 2 3 4				
	NDCEE Env, Safety, Occ Health, and Energy Technology Dem/													

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febr	uary 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0603779A <i>Technology</i> -	Element (Number I Environmental G Dem/Val	r/Name) ≀uality	Project (Number/Nan 035 / National Defense Excellence	ne) e Cntr For Enviro
	Schedule Detai	Is			
		Sta	art	E	nd
Events		Quarter	Year	Quarter	Year
NDCEE Management and Operations (Enduring)		1	2019	4	2024
NDOFF Free Orfets Ore Uselike and Freeman Technology Dem	· · · / · · ·	1 . ,			

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060377 Technology	am Elemen '9A I Enviro y - Dem/Val	t (Number / nmental Qu	Name) vality	Project (N E21 / Envir Dem/Val	umber/Nan ronmental G	ne) Quality Techr	nology
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
E21: Environmental Quality Technology Dem/Val	-	9.505	13.077	8.115	-	8.115	6.792	6.982	4.306	4.060	0.000	52.837
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project supports Advanced Component Development and Prototypes of innovative environmental quality technologies that modernize materials and processes required for current and future operational sustainment and warfighter training capabilities. The Project showcases technologies that increase life safety, reduce Soldier and worker human health risks, enhance readiness and enable mission capabilities of the current and future force with a focus on eliminating the high priority issues associated with hexavalent chromium, cadmium and airborne lead through material substitution. The Project expedites technology transition from the laboratory to operational use by demonstrating modern materials and processes to fulfill or surpass the performance requirements outlined in Material Specifications, Depot Maintenance Work Requirements, Technical Manuals, Drawings and other technical data. Forward-looking materials and processes demonstrated under this project support the Cross Functional Teams and the Army's top modernization priorities by addressing potential obsolescence of legacy materials and current and emerging impacts on human health and the environment. Modernized materials and processes have the additional benefit of reducing future regulatory compliance and cleanup requirements while simultaneously increasing performance and standardization across the Army, resulting in significantly reduced life cycle costs incurred by acquisition, industrial base and installation end users.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<i>Title:</i> Environmental quality technology demonstration and validation: Toxic Metal Reduction in Surface Finishing of Army Weapon Systems (CCDC)	2.954	2.173	3.154
Description: Increase operational readiness and reduce Soldier and worker human health risks by reducing or eliminating the use of cancer-causing hexavalent chromium, cadmium and associated toxic materials used in surface finishing processes for the current and future force. These surface coating technologies will be used to provide superior corrosion and wear protection for components used on Future Vertical Lift and Next Generation Combat Vehicles and enable increased performance/extended barrel life for Long Range Precision Fire systems.			
FY 2020 Plans: Will demonstrate zinc-nickel alternatives to cadmium for use on fasteners, electrical connectors and in brush plating; will qualify portable cold spray system and trivalent chromium electroplating as hard chrome alternatives.			
FY 2021 Plans: Will complete demonstration of cold spray gun barrels with increased barrel life; will validate hexavalent chromium-free aluminum anodizing process at pilot scale and demonstrate on relevant aircraft.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

PE 0603779A: *Environmental Quality Technology - Dem/V...* Army

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A <i>I Environmental Quality</i> <i>Technology - Dem/Val</i>	Project (E21 / Env Dem/Val	Number/N vironmenta	lame) al Quality Tecl	hnology
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2019	FY 2020	FY 2021
Economic adjustment					
<i>Title:</i> Environmental quality technology demonstration and validation: Airborne (CCDC)	E Lead Reduction from Army Weapon Systems		1.837	1.659	2.232
Description: Sustain Soldier training readiness, maintain/restore training capatelead exposure and increase life safety and protection of human health on Army toxic lead compounds? which are known to cause damage to central nervous term effects for children, as well as potential developmental impacts, including rocket and missile propellants and primary explosives (primers/detonators/initial free formulations will provide a domestic, readily available source for primary examples and Soldier Lethality systems.	ability at ranges closed due to dangerous levels y installations by reducing or eliminating the us , cardiovascular and immune systems with long IQ loss, behavioral issues and hearing loss - i ators) for the current and future force. These I explosives used in all Long Range Precision Fin	s of e of g- n ead- res			
FY 2020 Plans: Will demonstrate lead-free primer in small/medium caliber ammunition; will conduble-base propellants for Hydra rockets.	nplete flight weight demonstration of reduced-l	ead			
FY 2021 Plans: Will demonstrate lead-free fuze (combining primer and detonator) in hand gren minimum signature rocket propellants in heavy-weight motors.	nade configuration; will demonstrate lead-free				
FY 2020 to FY 2021 Increase/Decrease Statement: FY20 decrease aligns program requirements with Army modernization prioritie	S.				
<i>Title:</i> Environmental quality technology demonstration and validation: Low Glo Ozone Depleting Substances (ODS) (CCDC)	bal Warming Potential (LGWP) Alternatives to		0.250	0.191	0.226
Description: Evaluate low GWP ODS alternatives being developed by industriand verify their acceptability in military unique refrigeration and fire suppression Next Generation Combat Vehicle.	y to assess their toxicity and flammability haza n applications, including Future Vertical Lift an	rds d			
FY 2020 Plans: Will validate and promulgate the demonstrated refrigerant flammability test me	thod.				
FY 2021 Plans: Will conduct vehicle-scale demonstrations for alternative, low GWP extinguishing performance requirements for occupied crew compartments.	ing agents with high potential to meet safety ar	nd			
FY 2020 to FY 2021 Increase/Decrease Statement:					

PE 0603779A: *Environmental Quality Technology - Dem/V...* Army

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A <i>I Environmental Quality</i> <i>Technology - Dem/Val</i>	Projec E21 / I Dem/\	c t (Number/N Environmenta /al	lame) al Quality Tecl	hnology
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2019	FY 2020	FY 2021
Economic adjustment.					
<i>Title:</i> Environmental quality technology demonstration and validation: Procedures (USACE)	ESOH Impacts of Short-Term Noise Assessment		0.250	-	-
Description: Demonstrate and validate the technologies, including the short-term noise assessment procedures on environmental footprint at have validated short-term noise assessment procedures, including und modules for Sustainable Range Program range officers on performing	e underlying computational algorithms, for the impact on nd Soldier readiness. When completed the program with certainty metrics and 2) have on-line, self-guided training and interpreting short-term noise assessment results.	of ill: 1) ng			
<i>Title:</i> Environmental quality technology demonstration and validation:	Insensitive Munitions (IM) Wastewater Treatment (US	ACE)	1.681	1.604	0.905
Description: Demonstrate and validate optimized scalable wastewate treatment of existing and emerging insensitive munitions (IM) contamin ammunition plant munitions production.	er treatment system basic technology for the destructiv nated production wastewater generated during Army	e			
<i>FY 2020 Plans:</i> Will continue operation of Fenton oxidation pilot demonstration system adjust operations and perform manufacturing trials to optimize treatme wastewaters. Will install pilot demonstration unit for continuous precipi MCAAP.	n at MCAAP with ramp up to 500 gpd total capacity. Wi ent. Will document cost savings for Fenton oxidation of itation and membrane concentration of IM wastewaters	ill IM s at			
<i>FY 2021 Plans:</i> Will install pilot demonstration unit for continuous precipitation and me work with local authorities to verify release limits and treatment optimiz	mbrane concentration of IM wastewaters at MCAAP. V zation.	Vill			
FY 2020 to FY 2021 Increase/Decrease Statement: Economic adjustment.					
<i>Title:</i> Environmental quality technology demonstration and validation: (USACE)	Environmental Toolkit for Expeditionary Operations		1.275	0.794	0.505
Description: Conduct pilot-scale demonstration and validation studies methods developed for rapidly collecting environmental data in the field requirements on installations. Demonstrate the ability of ETEO softwar sensors through simple device driver (with minimal or no development for their ability to detect and quantify environmental contaminants. Der designated locations.	s to determine the effectiveness of basic technologies/ Id for the purposes of reducing impact of environmenta re to communicate easily with new, commercially avail t). Assess available chemical databases on the new se monstrate the operational ETEO software and sensors	ll able ensor at			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A / Environmental Quality Technology - Dem/Val	Projec E21 / Dem/\	c t (Number/N Environmenta Val	lame) al Quality Tec.	hnology
B. Accomplishments/Planned Programs (\$ in Millions)		[FY 2019	FY 2020	FY 2021
<i>FY 2020 Plans:</i> Will demonstrate software and sensors package for environmental baseline endemonstration of ETEO at an ARMY installation with Directorate of Public Wo Security; and Directorate of Emergency Services on developed platform and puring this phase, a two-day field demonstration will be conducted. The demonstration the presence of environmental contaminants in soils with the set ETEO software and to quickly understand the resulting information and its important.	valuation capabilities with engineer soldiers. Porks; Directorate of Plans, Training, Mobilization prepare a technical/functional assessment reports that a technical be conducted to test the installation sensor suite to transfer that data into an EBS upplication to operations.	erform , and ort. on?s sing			
FY 2021 Plans: Will develop instructional videos for all current ETEO tools and software to strusers. Test and demonstrate a new sensor as a potential replacement for the in the ETEO toolkit. Will demonstrate new auto-fill capabilities in the reporting Environmental Baseline Surveys.	eamline training use of ETEO for current and f PET kit. Reduce the amount of consumables software to decrease Soldiers time populating	uture I			
FY 2020 to FY 2021 Increase/Decrease Statement: Economic adjustment.					
<i>Title:</i> Environmental quality technology demonstration and validation: Fate an (FRESCO?)	nd Risk Evaluation System for Contaminants		1.258	1.469	1.093
Description: FRESCO? will ensure Solider readiness through reduction in trawill provide the capability to model and forecast contaminant fate and health r environment, pursuant to unfilled technology gap identified in DoD Instruction	aining range down time. Validation of FRESCO isks associated with new military materials in t Number 4715.18.	? 1e			
 FY 2020 Plans: 1) Will finalize integration of upgraded existing components, perform testing at testing will be finalized in FY20. 2) Will add new capabilities to FRESCO?, perform testing and debugging ? sin new fate and transport models and databases have been developed. Soils Mobe upgraded to give greater support in evaluating the fate and transport of EC 3) Will validate FRESCO? System using existing army data ? the project team (TTA) partners to select an applicable demonstration site that will allow us to a FY 2021 Plans: Validation of FRESCO will provide the capability to model and forecast contarmilitary materials in the environment, pursuant to unfilled technology gap identification. 	nd debugging ? existing component integration nce the development of ARAMS? and TREEC odel, Vadose Zone Model, and Channel Model n will work with our Technology Transition Agre demonstration and validate the full system feat minant fate and health risks associated with ne tified in DoD Instruction Number 4715.18.The	a and S?, will ement ures. w			

Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) Project (Number/Name) 2040 / 4 PE 06037740 <i>L Environmental Quality</i> PE / 2020 FY 2019 FY 2020 FY 2020 B. Accomplishments/Planned Programs (\$ in Millions) FF 2019 FY 2019 FY 2020 FY 2020 Rescent (TTA) partners to select an applicable demonstration site that will allow us to demonstration and validate the full system features. FY 2021 for 2021 for 2021 FY 2021 for 2021 for 2021 FY 2021 for 2021	Exhibit R-2A, RDT&E Project Justi	fication: PB	2021 Army							Date: Fe	bruary 2020		
B. Accomplishments/Planned Programs (\$ in Millions) FY 2019 FY 2020 FY 2021 FRESCO System will be further validated using existing Army data - the project team will work with our Technology Transition Agreement (TA) partners to select an applicable demonstration site that will allow us to demonstration and validate the full system features. FY 2021 FY 2020 FY 2021 FY 2020 FY 2021 FY 2020	Appropriation/Budget Activity 2040 / 4				R-1 P PE 06 <i>Techn</i>	rogram Eler 03779A / En ology - Dem	nent (Numbe vironmental (/Val	e r/Name) Quality	Project (N E21 / Env Dem/Val	ironmental	a me) Quality Teci	hnology	
FRESCO System will be further validated using existing Army data - the project team will work with our Technology Transition Agreement (TA) partners to select an applicable demonstration site that will allow us to demonstration and validate the full system features. Image: Comparison of Com	B. Accomplishments/Planned Prog	grams (\$ in N	<u>/lillions)</u>						F	Y 2019	FY 2020	FY 2021	
FY 2020 to FY 2021 Increase/Decrease Statement: Image: dust or economic adjustment. Image: dust or economic adjustment. Title: FY 2020 SBIR/STTR Transfer - 0.187 Description: Funding transferred in accordance with Title 15 USC 638 - 0.187 FY 2020 to FY 2021 Increase/Decrease Statement: - 0.187 Funding transferred in accordance with Title 15 USC 638 - 0.187 FY 2020 to FY 2021 Increase/Decrease Statement: - 9.505 8.077 8.111 Funding transferred in accordance with Title 15 USC 638 - - 5.000 - 8.111 Congressional Add: Environmental quality technology demonstration and validation: Congressional Add - Protective Catings/Biopolymers - 5.000 - - - 8.000 FY 2020 Plans: Environmental quality technology demonstration and validation: Congressional Add - Protective Catings/Biopolymers - 5.000 - <td>FRESCO System will be further valid Agreement (TTA) partners to select a system features.</td> <td>lated using ex an applicable</td> <td>xisting Army demonstrat</td> <td>data - the p ion site that</td> <td>roject team will allow us</td> <td>will work with to demonstr</td> <td>n our Technol ation and val</td> <td>logy Transition idate the full</td> <td>n i</td> <td></td> <td></td> <td></td>	FRESCO System will be further valid Agreement (TTA) partners to select a system features.	lated using ex an applicable	xisting Army demonstrat	data - the p ion site that	roject team will allow us	will work with to demonstr	n our Technol ation and val	logy Transition idate the full	n i				
Title: FY 2020 SBIR/STTR Transfer - 0.187 - 0.187 Description: Funding transferred in accordance with Title 15 USC 638 - 0.187 - 0.187 FY 2020 Plans: - 0.187 - 0.187 - 0.187 FY 2020 to FY 2021 Increase/Decrease Statement: - 0.187 - 0.187 - - 0.187 - - 0.187 - - 0.187 - - 0.187 - - 0.187 - - 0.187 - - 0.187 - - 0.187 - - 0.187 - - 0.187 - - 0.187 - - 0.187 - - 0.187 - - - - 0.117 - - - 0.117 - <td>FY 2020 to FY 2021 Increase/Decre Funding change due to economic ad</td> <td>ease Statem justment.</td> <td>ent:</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	FY 2020 to FY 2021 Increase/Decre Funding change due to economic ad	e ase Statem justment.	ent:										
Description: Funding transferred in accordance with Title 15 USC 638 Image: Comparison of the title 15 USC 638 Image: Comparison of title 15 USC 638 Image: Comparison of title 15 USC 638 FY 2020 for FY 2021 Increase/Decrease Statement: FY 2020 for FY 2021 Increase/Decrease Statement: Image: Comparison of title 15 USC 638 Image: Comparison of title 15 U	Title: FY 2020 SBIR/STTR Transfer									-	0.187	-	
FY 2020 Plans: Funding transferred in accordance with Title 15 USC 638 FY 2020 to FY 2021 Increase/Decrease Statement: Accomplishments/Planned Programs Subtotals 9.505 8.077 8.112 Congressional Add: Environmental quality technology demonstration and validation: Congressional Add - - 5.000 Protective Coatings/Biopolymers FY 2019 FY 2020 5.000 FY 2020 Plans: Environmental quality technology demonstration and validation: Congressional Add - - 5.000 Congressional Add: Environmental quality technology demonstration and validation: Congressional Add - 5.000 5.000 Cotings/Biopolymers FY 2019 FY 2021 FY 2023 FY 2023 Cotings/Biopolymers EY 2021 FY 2021 FY 2023 FY 2023 Cotings/Biopolymers EY 2021 FY 2021 FY 2023 FY 2023 FY 2025 Congressional Adds Subtotals - 0.000 3.286 Cotings/Biopolymers 0.921 0.562 0.444 - 0.444 0.450 0.480 0.298 FY 2025 Complete Total Cos · 06i: Environmental 0.921 0.562 0.444 - 0.444 0.450	Description: Funding transferred in	accordance v	vith Title 15	USC 638									
Funding transferred in accordance with Title 15 USC 638 Accomplishments/Planned Programs Subtotals 9.505 8.077 8.111 FY 2019 FY 2020 Congressional Add: Environmental quality technology demonstration and validation: Congressional Add - - 5.000 Protective Coatings/Biopolymers FY 2020 Plans: Environmental quality technology demonstration and validation: Congressional Add - Protective Coatings/Biopolymers 5.000 Congressional Adds Subtotals - 5.000 OCO Total FY 2021 FY 2023 <th c<="" td=""><td>FY 2020 Plans: Funding transferred in accordance w FY 2020 to FY 2021 Increase/Decre</td><td>ith Title 15 U ease Statem</td><td>SC 638 ent:</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th>	<td>FY 2020 Plans: Funding transferred in accordance w FY 2020 to FY 2021 Increase/Decre</td> <td>ith Title 15 U ease Statem</td> <td>SC 638 ent:</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	FY 2020 Plans: Funding transferred in accordance w FY 2020 to FY 2021 Increase/Decre	ith Title 15 U ease Statem	SC 638 ent:									
Accomplishments/Planned Programs Subtotals 9.505 8.077 8.111 FY 2019 FY 2020 Congressional Add: Environmental quality technology demonstration and validation: Congressional Add - - 5.000 FY 2020 Plans: Environmental quality technology demonstration and validation: Congressional Add - Protective Coatings/Biopolymers FY 2020 Plans: Environmental quality technology demonstration and validation: Congressional Adds Subtotals - 5.000 Congressional Adds Subtotals - 5.000 Cost To Cost To Cost To Cost To Line Item FY 2021 FY 2021 FY 2022 FY 2023 FY 2025 Cost To Cost To Cost To Line Item FY 2020 Base OCO Total FY 2023 FY 2024 FY 2025 Complete Total Cos 0.61: Environmental 0.921 0.562 0.444 - 0.480 0.298	Funding transferred in accordance w	ith Title 15 U	SC 638										
FY 2019 FY 2020 Congressional Add: Environmental quality technology demonstration and validation: Congressional Add - - 5.000 Protective Coatings/Biopolymers - 5.000 FY 2020 Plans: Environmental quality technology demonstration and validation: Congressional Add - Protective - - Coatings/Biopolymers - 5.000 - FY 2020 Plans: Environmental quality technology demonstration and validation: Congressional Add - Protective - - Coatings/Biopolymers - 5.000 - - Conter Program Funding Summary (\$ in Millions) - - - - Line Item FY 2019 FY 2020 Base OCO Total FY 2023 FY 2023 FY 2025 Complete Total Cos · 061: Environmental 0.921 0.562 0.444 - 0.444 0.450 0.480 0.298 0.130 0.000 3.285 Quality Technology Support Remarks - 0.444 - 0.444 0.450 0.480 0.298 0.130 0.000 3.285 D. Acquisition Strategy The project ultimately transitions successfully demonstra					Accor	nplishments	s/Planned Pr	ograms Sub	totals	9.505	8.077	8.115	
Congressional Add: Environmental quality technology demonstration and validation: Congressional Add - - 5.000 Protective Coatings/Biopolymers FY 2020 Plans: Environmental quality technology demonstration and validation: Congressional Add - Protective - 5.000 FY 2020 Plans: Environmental quality technology demonstration and validation: Congressional Add - Protective - - 5.000 Coatings/Biopolymers - Congressional Adds Subtotals - 5.000 C. Other Program Funding Summary (\$ in Millions) - Cost To Cost To Line Item FY 2019 FY 2020 Base OCO Total FY 2023 FY 2024 FY 2025 Complete Total Cost • 061: Environmental 0.921 0.562 0.444 - 0.444 0.450 0.480 0.298 0.130 0.000 3.284 Quality Technology Support Remarks - 0.444 - 0.444 0.450 0.480 0.298 0.130 0.000 3.284 D. Acquisition Strategy - - 0.444 - 0.444 0.450 0.480 0.298 0.130 0.								FY 2019	FY 2020	7			
FY 2020 Plans: Environmental quality technology demonstration and validation: Congressional Add - Protective Image: Congressional Adds Subtotals Image: Congressional Adds Subtotals Congressional Adds Subtotals - 5.000 C. Other Program Funding Summary (\$ in Millions) FY 2021 FY 2021 FY 2021 Line Item FY 2019 FY 2020 Base OCO Total 0.061: Environmental 0.921 0.562 0.444 - 0.444 0.450 0.480 0.298 FY 2025 Complete Total Cos Quality Technology Support 0.921 0.562 0.444 - 0.444 0.450 0.480 0.298 0.130 0.000 3.288 P. Acquisition Strategy The project ultimately transitions successfully demonstrated environmental quality technologies to Army acquisition, industrial base and installation end users. All technology efforts address a valid Army Environmental Requirements and Technology Assessments (AERTA) requirement. Efforts approved by senior Army	Congressional Add: Environmental Protective Coatings/Biopolymers	quality techr	iology demo	nstration an	d validation:	Congression	nal Add -	-	5.000)			
Congressional Adds Subtotals - 5.000 C. Other Program Funding Summary (\$ in Millions) FY 2021 FY 2021 FY 2021 FY 2021 FY 2021 FY 2022 FY 2023 FY 2024 FY 2025 Cost To Line Item FY 2019 FY 2020 Base OCO Total FY 2022 FY 2023 FY 2024 FY 2025 Complete Total Cos • 061: Environmental 0.921 0.562 0.444 - 0.444 0.450 0.480 0.298 0.130 0.000 3.285 Quality Technology Support FY D. Acquisition Strategy The project ultimately transitions successfully demonstrated environmental quality technologies to Army acquisition, industrial base and installation end users. All technology efforts address a valid Army Environmental Requirements and Technology Assessments (AERTA) requirement. Efforts approved by senior Army	FY 2020 Plans: Environmental quali Coatings/Biopolymers	ty technology	demonstrat	ion and valie	dation: Cong	ressional Ac	ld - Protective	e					
C. Other Program Funding Summary (\$ in Millions) FY 2021 FY 2021 FY 2021 Cost To Line Item FY 2019 FY 2020 Base OCO Total FY 2023 FY 2024 FY 2025 Cost To • 061: Environmental 0.921 0.562 0.444 - OCO Total FY 2023 FY 2024 FY 2025 Cost To • 061: Environmental 0.921 0.562 0.444 - 0.444 0.444 0.448 0.298 O.130 Cost To Quality Technology Support Remarks D. Acquisition Strategy The project ultimately transitions successfully demonstrated environmental quality technologies to Army acquisition, industrial base and installation end users. All technology efforts address a valid Army Environmental Requirements and Technology Assessments (AERTA) requirement. Efforts approved by senior Army					Cong	ressional A	dds Subtota	ls -	5.000)			
Line ItemFY 2019FY 2020FY 2021FY 2021FY 2021FY 2021FY 2022FY 2023FY 2023FY 2024FY 2025Cost To• 061: Environmental0.9210.9210.5620.444-0.4440.4500.4800.2980.1300.0003.281Quality Technology SupportRemarksD. Acquisition StrategyThe project ultimately transitions successfully demonstrated environmental quality technologies to Army acquisition, industrial base and installation end users. All technology efforts address a valid Army Environmental Requirements and Technology Assessments (AERTA) requirement. Efforts approved by senior Army	C. Other Program Funding Summa	ry (\$ in Milli	ons)										
I he project ultimately transitions successfully demonstrated environmental quality technologies to Army acquisition, industrial base and installation end users. All technology efforts address a valid Army Environmental Requirements and Technology Assessments (AERTA) requirement. Efforts approved by senior Army	Line Item • 06I: Environmental Quality Technology Support Remarks D. Acquisition Strategy	<u>FY 2019</u> 0.921	FY 2020 0.562	FY 2021 Base 0.444	FY 2021 OCO -	FY 2021 Total 0.444	FY 2022 0.450	FY 2023 0.480	FY 2024 0.298	FY 2025 0.130	Cost To Complete 0.000	<u>Total Cost</u> 3.285	
	I he project ultimately transitions suc All technology efforts address a valio	cesstully der d Army Enviro	nonstrated e onmental Re	environmenta quirements	al quality tec and Techno	nnologies to logy Assessi	Army acquis nents (AERT	ition, industria A) requiremei	al base and nt. Efforts a	I installatio approved b	n end users. y senior Arn	ıy	

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603779A <i>I Environmental Quality</i> <i>Technology - Dem/Val</i>	Project (Number/Name) E21 <i>I Environmental Quality Technology</i> <i>Dem/Val</i>
environmental leadership receive Advanced Component Dev for follow on implementation.	velopment and Prototype funding to fully demonstrate and vali	date the technology for transition to end users

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Pro PE 0603 <i>Technol</i>	o gram Ele 3779A I E logy - Der	e ment (N Environme m/Val	umber/Na ental Qual	a me) iity	Project E21 / E Dem/Va	(Number nvironmer al	r/ Name) htal Qualit	y Techno	logy
Management Service	es (\$ in M	illions)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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	-	-		0.187		-		-		-	0.000	0.187	-
		Subtotal	-	-		0.187		-		-		-	0.000	0.187	N/A
Test and Evaluation	(\$ in Milli	ons)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 O	2021 CO	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 Demonstrations	MIPR	Varies : Varies	27.292	9.505	Oct 2018	12.890	Oct 2019	8.115	Oct 2020	-		8.115	Continuing	Continuing	Continuing
		Subtotal	27.292	9.505		12.890		8.115		-		8.115	Continuing	Continuing	N/A
		Project Cost Totals	Prior Years	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	21.292	9.505		13.077		0.115		-		0.115	Continuing	Continuing	IN/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	٩rm	/																		Da	te: I	Febr	uary	2020			
Appropriation/Budget Activity 2040 / 4							R- PE <i>Te</i>	1 Pr 5 060 chnc	ogra 0377 plogy	am I 79A . y - <i>C</i>	Eleme Envi em/V	ent (ironi ′al	(Nur ment	nber tal Q	/Name uality	e)	Pi Ež D	roje 21 / e <i>m/</i>	ct (N Envi Val	lum ironr	ber/ nen	'Nan tal G	n e) Qualit	y Tec	hnole	ogy	
Event Name		FY	2019	•		FY:	2020		F	FY 2	021		F	Y 20	22		FY	202	3		FY	202	24		FY 2	2025)
	1	2	3	4	1	2	3	4	1	2	3 4	1	1	2 3	4	1	2	3	4	1	2	3	4	1	2	3	4
Toxic Metals Reduction Demonstration/Validation																											
Airborne Lead Reduction Demonstration/Validation																											
ESOH Impacts of Short-Term Noise Assessment Procedures De					ı																						
Advanced Water Reuse Technology for Fixed Installations																											
Insensitive Munitions (IM) Wastewater Treatment																											
Fate and Risk Evaluation System for Contaminants																											
Environmental Toolkit for Expeditionary Operations																											
Low Global Warming Potential Dem/Val																											
L																<u>I</u>				<u>I</u>				<u> </u>			

khibit R-4A, RDT&E Schedule Details: PB 2021 Army			Dat	te: February 2020
ppropriation/Budget Activity R-1 040 / 4 PE 0 Tech	Program Element (Numbe 603779A / Environmental (nology - Dem/Val	e r/Name) Quality	Project (Numb E21 <i>I Environn</i> Dem/Val	per/Name) nental Quality Technolog
Schedu	e Details			
	Si	art		End
Events	Quarter	Year	Quar	ter Year
Toxic Metals Reduction Demonstration/Validation	1	2015	4	2023
Airborne Lead Reduction Demonstration/Validation	1	2015	4	2025
ESOH Impacts of Short-Term Noise Assessment Procedures Demonstration/Va	lidation 1	2016	4	2019
Advanced Water Reuse Technology for Fixed Installations	1	2016	4	2019
Insensitive Munitions (IM) Wastewater Treatment	1	2018	4	2022
Fate and Risk Evaluation System for Contaminants	1	2019	4	2021
Environmental Toolkit for Expeditionary Operations	1	2019	4	2022
Low Global Warming Potential Dem/Val	1	2019	4	2025

Exhibit R-2, RDT&E Budget Item	chibit R-2, RDT&E Budget Item Justification: PB 2021 Army											
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)						am Elemen 90A / NATO	t (Number / Research a	ment				
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2025	Cost To Complete	Total Cost		
Total Program Element	4.762	-	4.762	4.852	4.951	5.008	5.066	0.000	33.609			
691: NATO Rsch & Devel	-	3.564	5.406	4.762	-	4.762	4.852	4.951	5.008	5.066	0.000	33.609

A. Mission Description and Budget Item Justification

This Project implements the provisions of Title 10 United States (U.S.) Code, Section 2350a, Cooperative Research and Development (R&D) Projects: Allied Countries. The objective is to improve, through the application of emerging technologies, the conventional defense capabilities of the U.S. and our cooperative partners, including the North Atlantic Treaty Organization (NATO), U.S. major non-NATO allies and Friendly Foreign countries through technology sharing and joint equipment development, thereby reducing U.S. acquisition costs. Cooperative efforts also improve multinational force compatibility with potential coalition partners through the development and use of similar equipment and improved interfaces. The Project focuses specifically on international cooperative technology demonstration, validation, and interoperability of Army weapon and command, control, communications and information (C3I) systems, including the NATO Defense Against Terrorism initiatives. Activities are implemented through international agreements with foreign partners that define scope, cost and work sharing arrangements, management, contracting, security, data protection and third party transfers. Funds are used to pay for only the U.S. work share that occurs in the United States at U.S. Government and U.S. contractor facilities.

3. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	3.682	5.406	5.516	-	5.516
Current President's Budget	3.564	5.406	4.762	-	4.762
Total Adjustments	-0.118	0.000	-0.754	-	-0.754
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-0.118	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	-0.754	-	-0.754

Change Summary Explanation

FY 2021 funding decrease to realize efficiencies per Leadership Priorities.

Exhibit R-2A, RDT&E Project Ju	xhibit R-2A, RDT&E Project Justification: PB 2021 Army											
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060379 Developme	a m Elemen 00A / NATO ent	t (Number / Research a	Project (N 691 / NATO	Number/Name) ⁻ O Rsch & Devel						
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	1 FY 2021 Total FY 2022 FY 2023 FY 2024				FY 2025	Cost To Complete	Total Cost
691: NATO Rsch & Devel	-	3.564	5.406	4.762	-	4.762	4.852	4.951	5.008	5.066	0.000	33.609
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project implements the provisions of Title 10 United States (U.S.) Code, Section 2350a, Cooperative Research and Development (R&D) Projects: Allied Countries. The objective is to improve, through the application of emerging technologies, the conventional defense capabilities of the U.S. and our cooperative partners, including the North Atlantic Treaty Organization (NATO), U.S. major non-NATO allies and Friendly Foreign countries through technology sharing and joint equipment development, thereby reducing U.S. acquisition costs. Cooperative efforts also improve multinational force compatibility with potential coalition partners through the development and use of similar equipment and improved interfaces. The Project focuses specifically on international cooperative technology demonstration, validation, and interoperability of Army weapon and command, control, communications and information (C3I) systems, including the NATO Defense Against Terrorism initiatives. Activities are implemented through international agreements with foreign partners that define scope, cost and work sharing arrangements, management, contracting, security, data protection and third party transfers. Funds are used to pay for only the U.S. work share that occurs in the United States at U.S. Government and U.S. contractor facilities.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Armaments Cooperation Enterprise Support	2.687	4.098	3.609
Description: Armaments Cooperation Enterprise Support/ International Online (IOL) Development and Implementation NATO/ International Cooperative R&D (AR 70-41) and International Acquisition (AR 70-1, AR 70-3).			
The goal of this activity is to expand worldwide allied standardization and interoperability through cooperative Research and Development (R&D) and technology sharing per SECDEF guidance and especially in support of the U.S. Army. The execution AR 70-41 responsibilities requires DASA (DE&C) to conduct engagement with key strategy foreign partners in all regions of the world through the SNR(A) program, international agreement negotiations, and other bilateral and multilateral forums involving DASA (DE&C) personnel. This program will fund the travel costs and administrative support (studies, analysis, interpretation, equipment, etc.) required to participate internationally, such as the NATO Army Armaments Group (NAAG), Defense Against Terrorism (DAT) and to pursue new cooperative R&D initiatives and international cooperative agreements such as memoranda of understanding.			
FY 2020 Plans: Funds will allow the coordination for cooperative research, development and evaluation of defense technologies / systems / equipment plus joint production and follow-on support of defense systems or equipment and the procurement of foreign technologies.			
FY 2021 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020				
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A / NATO Research and Development	Project (Number/I 691 / NATO Rsch o	Name) & Devel		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021	
Funds will allow the coordination for cooperative research, development and evelopment plus joint production and follow-on support of defense systems or e technologies.	valuation of defense technologies / systems / quipment and the procurement of foreign				
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funding decrease to realize efficiencies per Leadership Priorities.					
Title: Communications Interoperability, and Electronics Technologies	0.203	0.302	0.266		
Description: The goal of this activity is to develop technologies that enable int control, communications, sensors, and information systems. Efforts include development of multiple unique solutions and leverage existing interoperability include common doctrine, technical and procedural specifications to make bett leveraged national operating picture capabilities and enable the development of security domains and national networks architectures. Includes efforts from are Capabilities, Low Level Air Defense Interoperability, JTRS, Combat Identification	nd, ig ds ns, led				
FY 2020 Plans: FY 2020 funds include efforts from areas formerly titled Multi-National Network Interoperability, JTRS, Combat Identification, and Multilateral Interoperability P	Enabled Capabilities, Low Level Air Defense Program.				
FY 2021 Plans: FY 2021 funding include efforts from areas formerly titled Multi-National Netwo Interoperability, JTRS, Combat Identification, and Multilateral Interoperability P	ork Enabled Capabilities, Low Level Air Defenso Program.	9			
FY 2020 to FY 2021 Increase/Decrease Statement: A decrease in funding from FY 2020 to FY 2021 due to economic adjustments.					
Title: Senior National Representatives (Army) (SNR-(A))		0.021	0.031	0.028	
Description: Senior National Representatives (Army) (SNR-(A)) Projects (Part Italy): Supports harmonization of programs at various levels: exchanging inform feasibility studies to further promote cooperative development; standardizing, f distributing the workload among the different nations. Technology Demonstration NATO Army Armaments Group (NAAG), will provide an opportunity to observe of participating NATO nations with a view to assisting future operational and m studies, analysis and technology demonstrations.	tners: France, Germany, United Kingdom and nation, identifying knowledge gaps and conduc ielding and road-mapping various processes; ons hosted by the U.S. reps to Land Group 6, and demonstrate the current and future capat ateriel interoperability. Army support of NAAG	ting			

Appropriation/Budget Activity R-1 Program Element (Number/National Stress of the second s	ame) Project (Number d 691 / NATO Rsch	/Name) & Devel	
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<i>FY 2020 Plans:</i> Funds will be used to pursue cooperative initiatives that were postponed, cancelled or not pursued due to funding reprevious years such as forums and engagement with long-standing foreign partners to identify interoperability gaps necessary standardization programs.	eductions in and develop		
FY 2021 Plans: Funds will be used to pursue cooperative initiatives that were postponed, cancelled or not pursued due to funding reprevious years such as forums and engagement with long-standing foreign partners to identify interoperability gaps necessary standardization programs.	eductions in and develop		
FY 2020 to FY 2021 Increase/Decrease Statement: A decrease in funding from FY 2020 to FY 2021 due to economic adjustments.			
<i>Title:</i> Weapons and Munitions Technologies	0.16	0.243	0.214
Description: The goal of this activity is to cooperate with partner countries to increase interoperability and develop technologies to improve range, payloads, speed, survivability and lethality to maintain U.S. technical superiority and overmatch for Army weapons systems and associated munitions. Areas of cooperation include fuzing and warhead guidance systems, counter improvised explosive device neutralization, directed energy, and fire control systems. S cooperative development will be done under the auspices of international agreements established among the partic countries for the purposes of improving defense capabilities of the U.S. and partner countries.	jointly I combat systems, uch ipating		
FY 2020 Plans: Weapons and munitions technologies (Partners: France, Germany, Italy, UK): The Participants in this program will of automated software interface between their national field artillery command and control systems. The nations will be receive and provide mutual fire support (i.e. cannon and rocket fire) in combined operations more rapidly and with n	develop an e able to ninimal errors.		
FY 2021 Plans: Weapons and munitions technologies (Partners: France, Germany, Italy, UK): The Participants in this program will of automated software interface between their national field artillery command and control systems. The nations will be receive and provide mutual fire support (i.e. cannon and rocket fire) in combined operations more rapidly and with n	develop an e able to ninimal errors.		
FY 2020 to FY 2021 Increase/Decrease Statement: A decrease in funding from FY 2020 to FY 2021 due to economic adjustments.			
Title: Ground Systems Technologies	0.16	0.243	0.214

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: Fe	ebruary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A / NATO Research and Development	Project (691 / <i>NA</i>	(Number/N TO Rsch &	lame) Devel	
B. Accomplishments/Planned Programs (\$ in Millions)		F	FY 2019	FY 2020	FY 2021
Description: The goal of this activity is to cooperate with partner countries to in technologies to improve survivability, weapons, ground platforms (manned and to provide soldiers with unmatched offensive and defensive capabilities in wear include ground systems design, propulsion, structures, robotics, alternative fue and power management. Such cooperative development will be done under the among the participating countries for the purposes of improving defense capabilities.	ty tion nics, ished				
FY 2020 Plans: FY 2020 funding will be used to fund the continuation of cooperative projects in unmanned ground vehicles such as Hybrid Electric Project Agreement between	n armored vehicle underbody blast protection n US and Japan.	and			
FY 2021 Plans: FY 2021 funding will be used to fund the continuation of cooperative projects in unmanned ground vehicles such as Hybrid Electric Project Agreement between	and				
FY 2020 to FY 2021 Increase/Decrease Statement: A decrease in funding from FY 2020 to FY 2021 due to economic adjustments.					
Title: Aviation Systems Technologies			0.327	0.489	0.431
Description: The goal of this activity is to cooperate with partner countries to in improved aerodynamics, aeromechanics, avionics, weapons and sensor integri technologies that improve range, payloads, speed, survivability and lethality to overmatch for vertical lift aviation systems. Such cooperative development will agreements established among the participating countries for the purposes of in partner countries.	ncrease interoperability and develop jointly ration, propulsion, and aviation autonomy maintain U.S. technical superiority and comb be done under the auspices of international improving defense capabilities of the U.S. and	at			
FY 2020 Plans: FY 2020 funding will be used to pursue cooperative projects (i.e., the developm systems that aid pilots and aircrew in degraded visual environments).	nprove				
FY 2021 Plans: FY 2021 funding will be used to pursue cooperative projects (i.e., the developm systems that aid pilots and aircrew in degraded visual environments).	nprove				
FY 2020 to FY 2021 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A <i>I NATO Research and</i> <i>Development</i>	Project (Number/N 691 / NATO Rsch &	lame) & Devel	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
A decrease in funding from FY 2020 to FY 2021 due to economic adjustments.				
	Accomplishments/Planned Programs Sub	totals 3.564	5.406	4.762
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy				
Acquisition Strategy: The goal of this program is to expand worldwide allied standardization interope SECDEF guidance and especially in support of the of the U.S. Army. All projects are test or technical demonstrations to feed into potential new require improvements to the Current Force.	erability through cooperative research and dev uirements in support of Army Transformation to	velopment (R&D) and the Future Force or	l technology s - as product	sharing per
List of the programs curently in place: Communications, Interoperability, and Electronics Technologies The goal of this project is to develop technologies that enable interoperability a systems. Efforts under this project include development of a single solution s interoperability standards developed by NATO. Such standards include comm information, shared data, leverage national operating picture capabilities and e domains and national networks architectures. Includes projects formerly titled JTRS, Combat Identification, and Multilateral Interoperability Program.	among partner countries' command, control, co tandard avoiding development of multiple uniq on doctrine, technical and procedural specifica enable the development of interoperability of da Multi-National Network Enabled Capabilities, I	ommunications, sens jue solutions and lev ations to make better ata, databases, appl Low Level Air Defens	ors, and infor erage existing use of existir ications, secu se Interoperal	rmation g ng irity bility,
Aviation Systems Technologies The goal of this project is to cooperate with partner countries to increase intercand and sensor integration, propulsion, and aviation autonomy technologies that in superiority and combat overmatch for vertical lift aviation systems. Such coop established among the participating countries for the purposes of improving de	operability and develop jointly improved aerody nprove range, payloads, speed, survivability ar erative development will be done under the au efense capabilities of the U.S. and partner cour	ynamics, aeromecha nd lethality to mainta uspices of internation ntries.	nics, avionics in U.S. techni al agreement	s, weapons ical is
Ground Systems Technologies The goal of this project is to cooperate with partner countries to increase interce platforms (manned and unmanned), and mobility and counter-mobility to provious vehicles. Areas of cooperation include ground systems design, propulsion, st	operability and develop jointly technologies to i de soldiers with unmatched offensive and defe ructures, robotics, alternative fuels and lubrica	improve survivability ensive capabilities in ants, systems integra	, weapons, gr weapons and tion, electroni	ound I military ics, and

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603790A / NATO Research and Development	Project (Number/Name) 691 / NATO Rsch & Devel
power management. Such cooperative development will be done purposes of improving defense capabilities of the U.S. and partne	e under the auspices of international agreements establish er countries.	ed among the participating countries for the
Weapons and Munitions Technologies The goal of this project is to cooperate with partner countries to ir and lethality to maintain U.S. technical superiority and combat ov and warhead systems, guidance systems, counter improvised ex will be done under the auspices of international agreements estal and partner countries.	ncrease interoperability and develop jointly technologies to rermatch for Army weapons systems and associated munit plosive device neutralization, directed energy, and fire con blished among the participating countries for the purposes	improve range, payloads, speed, survivability ions. Areas of cooperation include fuzing trol systems. Such cooperative development of improving defense capabilities of the U.S.
Armaments Cooperation Enterprise Support The goal of this program is to expand worldwide allied standardiz per SECDEF guidance and especially in support of the U.S. Army equipment, etc.) required to participate internationally, such as the Terrorism (DAT) and to pursue new cooperative R&D initiatives a also include: the United States' share of costs of the NATO Civil Cooperative Planning (U. S. Army is Executive Agent for this NAT many nations.	zation and interoperability through cooperative research an y. This program will fund the travel costs and administrative ne North Atlantic Treaty Organization (NATO) Army Armam and international cooperative agreements such as memora Budget, Chapter IX, which funds the NATO Industrial Advi TO bill); the Technical Cooperation Program, and Army arr	d development (R&D) and technology sharing e support (studies, analysis, interpretation, nents Group (NAAG), Defense Against nda of understanding. This program will isory Group (NIAG) and the Special Fund for maments cooperation working groups with

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	y								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Develo	o gram El o 3790A / / pment	ement (N NATO Res	lumber/N search an	ame) nd	Project 691 / <i>N</i> /	(Numbei ATO Rsch	r/ Name) a & Devel		
Management Service	es (\$ in M	lillions)		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
ArmamentsCooperation Enterprise Support	MIPR	DASA DEC HQDA : Ft Belvoir, VA	0.010	-		-		-		-		-	0.000	0.010	-
Weapons and Munitions	TBD	CECOM : Aberdeen Proving Ground, MD	0.008	-		-		-		-		-	0.000	0.008	-
Communications Interoperability and Electronic Technologies Interoperability	MIPR	SPAWAR : Various	0.010	-		-		-		-		-	0.000	0.010	-
Ground Systems Technologies	MIPR	TARDEC : Warren, MI	0.010	-		-		-		-		-	0.000	0.010	-
Chemical and Biological Technologies	MIPR	Aberseen Proving Groun : MD	0.010	-		-		-		-		-	0.000	0.010	-
		Subtotal	0.048	-		-		-		-		-	0.000	0.048	N/A
Product Developmer	nt (\$ in M	illions)		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
Missiles and Rocket Technologies	MIPR	APG, Redstone Arsenal : MD, AL	0.100	-		-		-		-		-	0.000	0.100	-
Communications, Interoperability, and Electronics Technologies	MIPR	CECOM, JTRS, COALWNW, JTNC, SPAWAR : San Diego,CA, various	0.529	-		-		-		-		-	0.000	0.529	-
Weapons and Munitions	Various	ARDEC, PEO AMMO, PM-CAS : VARIOUS	0.752	-		-		-		-		-	0.000	0.752	-
Aviation Systems Technologies	Various	AMRDEC : RED STONE, VARIOUS	0.175	-		-		-		-		-	0.000	0.175	-
Ground Systems Technology	FFRDC	Various : Various	0.125	-				-		-		-	0.000	0.125	-
		`													

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Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (Number/Name)PE 0603790A / NATO Research and691 / NATO Research andDevelopment691 / NATO Research and									
Product Developme	nt (\$ in M	illions)		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
SNR(A)	C/TBD	ARDEC: Arlington, VA : Various	9.012	-		-		-		-		-	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	0.118		-		-		-		-	0.000	0.118	-
		Subtotal	10.693	0.118		-		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2	019	FY 2	020	FY 2 Ba	2021 Ise	FY 2 O	2021 CO	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
Armaments Cooperation Enterprise Support	C/FFP	LSS/GDIT : Fairfax, VA	6.639	1.746		2.870		2.530		-		2.530	0.000	13.785	-
Missiles and Rocket Technologies	MIPR	APG, Redstone Arsenal : MD, AL	0.100	0.600		0.895		0.785		-		0.785	0.000	2.380	-
Communications, Interoperability, and Electronics Technologies	MIPR	Joint Tactical Radio (JTRS), JTNC, COALWNW, SPAWAR, CERDEC, ARDEC W1DF : San Diego, CA, Red Stone Arsenal	0.959	0.300		0.448		0.395		-		0.395	0.000	2.102	-
Aviation Systems Technologies	MIPR	RDECOM/ AMRDEC : Red Stone Arsenal	0.810	0.300		0.448		0.395		-		0.395	0.000	1.953	-
Ground Systems Technology	MIPR	TARDEC : Various	0.478	-		-		-		-		-	0.000	0.478	-
Weapons and Munitions	Various	CECOM, ARDEC, AMMO, PEO C3T : Aberdeen Proving Ground, Various	1.039	0.500		0.745		0.657		-		0.657	0.000	2.941	-
Soldier Technologies	TBD	Various : Various	0.346	-		-		-		-		-	0.000	0.346	-

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	y				R-1 Program Element (Number/Name)Project (Number/Name)PE 0603790A / NATO Research and691 / NATO Rsch & DevelDevelopment691 / NATO Rsch & Devel									
Support (\$ in Million	is)		ſ	FY 2	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
SNR(A)	C/TBD	ARL, HQDA, JCGISR: Army : Various	2.318	-		-		-		-		-	Continuing	Continuing	Continuing
Chemical & Biological Defense Technologies	MIPR	ECBC : Edgewood, Aberdeen, MD	0.270	-		-		-		-		-	0.000	0.270	-
		Subtotal	12.959	3.446		5.406		4.762		-		4.762	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)			ſ	FY	2019	9 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
Communications, Interoperability, and Electronics Technologies	Various	JTRN, JTNC, COALWNW, CERDEC, NIGHT VISION : SPAWAR	0.444	-		-		-		-		-	0.000	0.444	-
Weapons and Munitions	TBD	ARDEC, PEO AMMO, ASCA : Various	0.200	-		-		-		-		-	0.000	0.200	-
Aviation Systems Technologies	TBD	RDECOM, AMRDEC : RED STONE	0.080	-		-		-		-		-	0.000	0.080	-
Ground Systems Technologies	MIPR	TARDEC : Various	0.050	-		-		-		-		-	0.000	0.050	-
		Subtotal	0.774	-		-		-		-		-	0.000	0.774	N/A
		Prior Years	FY	2019	FY 2	2020	FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
		Project Cost Totals	24.474	3.564		5.406		4.762		-		4.762	Continuing	Continuing	N/A
Remarks															

xhibit R-4, RDT&E Schedule Profile: PB	2021 Arn	ıy																			Dat	e: Fe	ebru	ary	2020)	
oppropriation/Budget Activity 040 / 4	R-1 Pr PE 060 Develo						R-1 Program Element (Number/Name) PE 0603790A / NATO Research and Development						Project (Number/Name) 691 / NATO Rsch & Devel														
		FY	2012	2		FY	2013	3		FY	2014			FY	2015		F	Y 2	2016		FY	2017	7		FY	2018	3
		1 2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3 4	1	2	3	4	1	2	3	4
N/A																											
	F																							1			
		FY	2019)		FY	2020)		FY 2	2021			FY 2	2022		F	Y 2	2023		FY	2024	ŀ		FY :	2025	5
		1 2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3 4	1	2	3	4	1	2	3	4
N/A			•																								

chibit R-4A, RDT&E Schedule Details: PB 2021 Army			U	ate: Februar	IY 2020
opropriation/Budget Activity 40 / 4	R-1 Program Element (Numb PE 0603790A <i>I NATO Researc</i> <i>Development</i>	Ogram Element (Number/Name)Projec3790A / NATO Research and pment691 / N			
	Schedule Details				
	Schedule Details	tart		End	
Events	Schedule Details Schedule Details Quarter	tart Year	Qu	End	Year

Exhibit R-2, RDT&E Budget Item	n Justificat	ion: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACD	ation, Army I 0&P)	/ BA 4: Adva	anced	R-1 Progra PE 060380	am Elemen 1A / Aviatic	t (Number/ on - Adv Dev	Name) ⁄				
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	-	93.885	505.890	647.937	-	647.937	789.356	913.940	921.548	1,525.379	Continuing	Continuing
B47: Future Vertical Lift	-	93.885	107.590	134.436	-	134.436	178.235	483.442	773.385	871.644	Continuing	Continuing
F12: Future Attack Reconnaissance Aircraft	-	0.000	398.300	513.501	-	513.501	611.121	430.498	148.163	653.735	Continuing	Continuing

A. Mission Description and Budget Item Justification

Future Vertical Lift (FVL) is an initiative to develop a family of vertical lift aircraft for the United States Armed Forces. The Department of Defense (DOD) established FVL to focus vertical lift capabilities and technology development as well as retain long-term industrial base capabilities. The Deputy Secretary of Defense issued the FVL Strategic Plan in 2012 to outline a joint approach for the next generation vertical lift aircraft for all military services. The Strategic Plan provided a foundation for replacing the current fleet with advanced capability by shaping the development of vertical lift aircraft for the next 25 to 40 years. In Fiscal Year (FY) 2017, the Army identified FVL as one of the Army's six modernization priorities, and established the FVL Cross Functional Team. The FVL objectives are increased vertical lift maneuverability, range, speed, payload, survivability, and reliability while reducing the logistical footprint. This capability will provide critical aviation support to the joint warfighter and maneuver force. FVL will integrate advanced technologies and design configurations with appropriate trades to ensure affordability.

rogram Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	FY 2021 OCO	<u>FY 2021</u>	<u>Total</u>
Previous President's Budget	86.180	459.290	536.067	-	53	6.067
Current President's Budget	93.885	505.890	647.937	-	64	7.937
Total Adjustments	7.705	46.600	111.870	-	11	1.870
 Congressional General Reductions 	-	-				
 Congressional Directed Reductions 	-	-34.000				
 Congressional Rescissions 	-	-				
 Congressional Adds 	-	80.600				
 Congressional Directed Transfers 	-	-				
 Reprogrammings 	7.705	-				
 SBIR/STTR Transfer 	-	-				
 Adjustments to Budget Years 	-	-	111.870	-	11	1.870
Congressional Add Details (\$ in Millions, and Incl	udes General Redu	<u>ictions)</u>			FY 2019	FY 2020
Project: B47: Future Vertical Lift						
Congressional Add: Competitive Demonstration I	Risk Reduction				-	75.600
Congressional Add: Future Attack Reconnaissan	ce Aircraft				75,400	_

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date	: February 2020	0
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603801A / Aviation - Adv Dev		
Congressional Add Details (\$ in Millions, and Includes General Re	eductions)	FY 2019	FY 2020
	Congressional Add Subtotals for Project: B47	75.400	75.600
Project: F12: Future Attack Reconnaissance Aircraft			
Congressional Add: Future Long Range Assault Aircraft University	Partnership Effort	-	5.000
	Congressional Add Subtotals for Project: F12	-	5.000
	Congressional Add Totals for all Projects	75.400	80.600
FLRAA FY 2020 budget increased by \$75.6 million for Competitive De FY 2020 budget decreased by \$34.0 million to align with current Competitive increased by \$34.0 million to align with current Competitive increased by \$12.0 million to align with current Competitive is aligned incorrectly to Project F12 Future Attack Reconnaissa	emonstration Risk Reduction efforts and \$5 million for university	partnership effo	s are
execution	ance Aircraft. This funding will be correctly re-aligned to Project	for university pa 347 Future Verti	rts. FARA artnership ical Lift for

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060380	am Elemen)1A <i>I Aviatio</i>	t (Number/I n - Adv Dev	Name) ′	Project (N B47 / Futur	u mber/Na n e Vertical L	ne) ift	
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
B47: Future Vertical Lift	-	93.885	107.590	134.436	-	134.436	178.235	483.442	773.385	871.644	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Future Vertical Lift (FVL) Project's funding provides for the development of a Future Long Range Assault Aircraft (FLRAA) Capability Set Three weapon system within the FVL family of systems. FLRAA will conduct air assault, urban assault/security, maritime interdiction, medical evacuation, humanitarian assistance/disaster relief, tactical resupply, direct action, non combatant evacuation operation, and combat search and rescue operations in support of the Army, including Special Operations Command (USSOCOM) and the Joint Force, in a contested, near peer threat environment. The FLRAA weapon system will retain the Army's ability to project combat power with significantly increased range, speed, mobility, and payload over current Army and USSOCOM aircraft. FLRAA achieved a Materiel Development Decision approval in October 2016 and the Office of Secretary of Defense granted a sufficiency determination of the Analysis of Alternatives (AoA) in July 2019. Fiscal Year (FY) 2019 funded completion of the AoA, continued to support initiation of program documentation, and funded establishment of an FVL Architecture Risk Reduction effort in support of Modular Open Systems Approach (MOSA) for both FLRAA and the Future Attack Reconnaissance Aircraft. FY 2020 funding will support continuation of the FVL Architecture Risk Reduction effort; support life cycle affordability efforts; initiate planning and proposal evaluations of the Competitive Demonstration Risk Reduction efforts; and support the completion of key program documents to include the Program Strategy, Weapon System Specification, Systems Engineering Plan, Life Cycle Sustainment Plan (LCSP) and Contract Requirements Package (CRP). FY 2021 funding supports the continued execution of the Competitive Demonstration Risk Reduction and MOSA efforts, development of the CRP, and the initiation of Source Selection Evaluation Board (SSEB).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021			
Title: FVL Analysis of Alternatives (AoA)	1.190	-	-			
Description: FLRAA AoA modeling, simulation, and analysis performed by United States Army Training and Doctrine Command (U.S. TRADOC) Analysis Center, U.S. Army Materiel Systems Analysis Activity and other supporting agencies.						
Title: Engineering Services / Research Studies	5.173	22.085	121.926			
Description: Engineering research, planning, modeling, and analysis. Documentation and reviews supporting the FLRAA acquisition program.						
FY 2020 Plans: Supported completed and staffed key Program documentation to include the Weapon System Specification and Systems Engineering Plan and continued developing the Test and Evaluation Master Plan and CRP.						
FY 2021 Plans:						
Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	C	Date: February 2020				
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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603801A / Aviation - Adv Dev	Project (Nu B47 / Future	nber/l <i>Vertic</i>	Name) al Lift		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2	019	FY 2020	FY 2021	
Continue execution of Competitive Demonstration Risk Reduction and MOSA eleading to contract award.	efforts, support SSEB, and support key event	S				
FY 2020 to FY 2021 Increase/Decrease Statement: Increase technical staff to support efforts leading to contract award.						
Title: Program Management			9.654	5.063	7.326	
Description: Oversight and Management of the FLRAA acquisition program.						
FY 2020 Plans: Started the initiate execution of Competitive Demonstration Risk Reduction actidocumentation to include the Program Strategy, and continued developing the	ivities, completed and staffed key Program CRP					
<i>FY 2021 Plans:</i> Continue to complete efforts to refine affordability, execute of Competitive Dem Proposal, and execute SSEB.	onstration Risk Reduction, release Request	for				
FY 2020 to FY 2021 Increase/Decrease Statement: Increase Acquisition staff to support efforts leading to contract award.						
Title: Supportability Analysis and Acquisition Support			2.468	3.526	5.184	
Description: Acquisition and supportability research, planning, modeling, analy FLRAA acquisition program.	ysis, documentation and reviews supporting t	he				
FY 2020 Plans: Supported efforts to refine affordability refinement, completed the staffing of the continued developing the CRP.	e Life Cycle Sustainment Plan (LCSP) and					
<i>FY 2021 Plans:</i> Continue to support the developing of the CRP and the initiation of the SSEB.						
FY 2020 to FY 2021 Increase/Decrease Statement: Increase Logistics staff to support efforts leading to contract award.						
Title: FY 2020 SBIR/STTR Transfer			-	1.316	-	
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2020 Plans:						

Exhibit R-2A, RDT&E Project Justi	ification: PB	2021 Army							Date: Fe	bruary 2020		
Appropriation/Budget Activity 2040 / 4				R-1 P PE 06	r ogram Ele i 03801A <i>I A</i> u	m <mark>ent (Numbe</mark> viation - Adv D	r/Name) ev	Project (Number/Name) B47 <i>I Future Vertical Lift</i>				
B. Accomplishments/Planned Prog	grams (\$ in I	<u>Millions)</u>							FY 2019	FY 2020	FY 2021	
Funding transferred in accordance w	vith Title 15 U	SC ?638										
FY 2020 to FY 2021 Increase/Decr Funding transferred in accordance w	ease Statem vith Title 15 U	ent: ISC ?638										
				Accor	nplishment	s/Planned Pro	ograms Sub	ototals	18.485	31.990	134.436	
							FY 2019	FY 202	20			
Congressional Add: Competitive D	emonstration	Risk Reduc	tion				-	75.6	00			
FY 2020 Plans: Competitive Demon	stration Risk	Reduction										
Congressional Add: Future Attack	Reconnaissa	nce Aircraft					75.400)	-			
FY 2019 Accomplishments: Future	Attack Reco	nnaissance	Aircraft									
				Cong	ressional A	dds Subtotal	s 75.400	75.6	00			
C. Other Program Funding Summa	ary (\$ in Milli	ons)										
		-	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>					<u>Cost To</u>		
Line Item • 313: Adv Rotarywing Veh Tech	<u>FY 2019</u> 109.610	<u>FY 2020</u> -	<u>Base</u> 0.000	<u>000</u> -	<u>Total</u> 0.000	<u>FY 2022</u> -	<u>FY 2023</u> -	<u>FY 2024</u> -	<u>FY 2028</u>	<u>Complete</u> 0.000	<u>Total Cost</u> 109.610	
Remarks												

Program Element (PE) 0603003A Aviation Advanced Technology Project 313 Advanced Rotary-wing Vehicle Technology funds Army Science & Technology (S&T) projects to mature, demonstrate and integrate components, subsystems and systems for vertical lift and unmanned air vehicle technologies. These projects enables Army aviation modernization and reduce risk for FLRAA.

D. Acquisition Strategy

The Army is executing an accelerated acquisition approach to design, develop, and deliver the FLRAA weapons system. In order to support the Army's modernization strategy and concept for multi-domain operations, the FLRAA program will deliver a first unit equipped in FY 2030. This accelerated approach builds on the Joint Multi-Role Technology Demonstration (JMR-TD) efforts (ongoing since 2013); the Army's AoA (completed in July 2019); and multiple ongoing risk mitigation efforts.

The Army's risk mitigation activities ahead of the Program of Record (PoR) include: (1) additional conceptual design and flight envelop expansion tasks on the four existing JMR-TD Technology Investment Agreements; (2) a modular open systems approach (MOSA), FVL Architecture Collaboration Working Group (with participation from industry and academia) to establish a common architecture requirements framework for FLRAA and FARA system development; and (3) a Competitive Demonstration and Risk Reduction (CD&RR) effort using an Aviation Missile and Technology Consortium (AMTC) Other Transaction Authority (OTA) agreements to provide substantiating technical documentation on weapon system designs, requirements decompositions, trade-studies, and requirements feasibility for the FLRAA PoR.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0603801A / Aviation - Adv Dev	B47 / Futur	re Vertical Lift

These risk reduction activities maintain industry engagement & momentum from the JMR-TD S&T program, inform capabilities and system requirements, and provide initial trade assessments for the final operational requirements. They also inform the final acquisition strategy; mature the Government's architecture requirements development; and transition appropriate S&T data and technologies to the PoR. The Army plans to initiate the PoR in FY 2022 with a hybrid acquisition approach. This approach includes the opportunity to employ new DODI 5000.80 authorities along with a tailored DODI 5000.02 acquisition strategy.

Finally, the Army is also addressing life cycle affordability, sustainability, and maintainability early in the program. The FLRAA program is employing multiple strategies including: should cost reduction opportunities; use of a digital thread from design through sustainment; and stochastic sustainment modeling. Additionally, FLRAA is one of the Army's pilot programs for life cycle intellectual property and data strategy development.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 20)21 Arm	у								Date:	February	2020		
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name) PE 0603801A / Aviation - Adv Dev						Project (Number/Name) B47 / Future Vertical Lift				
Management Servic	es (\$ in M	lillions)		FY	2019	FY 2	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	Various	various : Redstone Arsenal, AL	-	3.060	Dec 2018	5.063	Dec 2019	7.326	Dec 2020	-		7.326	Continuing	Continuing	Continuing	
Program Management	MIPR	Army Contracting Command : Redstone Arsenal, AL	-	0.044	May 2019	-		-		-		-	Continuing	Continuing	-	
Program Management	MIPR	Aviation and Missile Command : Redstone Arsenal, AL	-	0.734	Oct 2018	-		-		-		-	Continuing	Continuing	-	
Program Management	MIPR	Aviation Missile Center Combat Capabilities Combat Command : Redstone Arsenal, AL	-	2.399	Nov 2018	-		-		-		-	Continuing	Continuing	-	
Program Management	Option/ FFP	Torch Technologies, Avion Solutions, various : Redstone Arsenal, AL	-	4.500	Dec 2018	-		-		-		-	Continuing	Continuing	-	
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.316		-		-		-	0.000	1.316	-	
		Subtotal	-	10.737		6.379		7.326		-		7.326	Continuing	Continuing	N/A	
Product Developme	nt (\$ in M	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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	
Analysis of Alternatives (AoA)	TBD	TRADOC Analysis Center : Fort Leavenworth, KS	-	1.190	Nov 2018	-		-		-		-	0.000	1.190	-	
		Subtotal	-	1.190		-		-		-		-	0.000	1.190	N/A	

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Pro PE 060	ogram Ele 3801A <i>I A</i>	ement (N viation -	umber/Na Adv Dev	ame)	Project (Number/Name) B47 / Future Vertical Lift				
Support (\$ in Millions	5)			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 Services / Research Studies - Organic	MIPR	VARIOUS : VARIOUS	-	0.039	Nov 2018	13.114	Feb 2020	2.268	Mar 2021	-		2.268	Continuing	Continuing	Continuing
Engineering Services/ Competitive Demonstration Risk Reduction - Other	C/TBD	TBD : TBD	-	-		75.600	Mar 2020	-		-		-	0.000	75.600	-
Engineering Services / Research Studies - Other	C/CPFF	Georgia Tech Research Institute : Huntsville, AL	-	2.917	Aug 2019	8.971	Mar 2020	-		-		-	Continuing	Continuing	Continuing
Engineering Services / Research Studies - Other	Option/ FFP	varioius : Huntsville, AL	-	0.512	May 2019	-		119.658	Mar 2021	-		119.658	0.000	120.170	Continuing
Engineering Services / Research Studies - Other	Option/ FFP	John H Northrup & Associates : Huntsville, AL	-	0.227	Jun 2019	-		-		-		-	0.000	0.227	-
Acquisition and Supportability Analysis	C/Various	Army Materiel Command / Army Contracting Command/Army Future Command : Redstone Arsenal, AL	-	2.468	Dec 2018	3.526	Nov 2019	5.184	Nov 2020	-		5.184	Continuing	Continuing	Continuing
Future Attack Reconnaissance Aircraft Execution	C/Various	CCDC AvMC : Redstone Arsenal, AL	-	75.400	Jun 2019	-		-		-		-	0.000	75.400	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	0.395	Nov 2019	-		-		-		-	0.000	0.395	-
		Subtotal	-	81.958		101.211		127.110		-		127.110	Continuing	Continuing	N/A
		Prior Years	FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals			-	93.885		107.590		134.436		-		134.436	Continuing	Continuing	N/A
<u>Remarks</u>															

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hibit R-4A, RDT&E Schedule Details: PB 2021 Army	Date: February 2020									
propriation/Budget Activity 40 / 4	R-1 Program Element (Number/Name)Project (Number/Name)PE 0603801A / Aviation - Adv DevB47 / Future Vertical Lift									
	Schedule Details									
	St	tart	E	ind						
Events	Quarter	Year	Quarter	Year						
Materiel Development Decision	1	2017	1	2017						
Analysis of Alternatives	3	2017	4	2019						
Weapons System Specification Development	2	2019	1	2021						
Program Documentation and Contracts Requirements Package	2	2019	3	2021						
Architecture Definition and Risk Reduction	3	2019	4	2024						
Competitive Demonstration and Risk Reduction	2	2020	2	2022						
Request for Proposal Release	3	2021	3	2021						
Proposal Preparation	3	2021	4	2021						
Source Selection Evaluation Board	4	2021	2	2022						
Contract Award	2	2022	2	2022						
Preliminary Design	2	2022	4	2023						
Detailed Design	4	2023	1	2025						
First Prototype Delivery	2	2025	2	2025						
Flight Testing	2	2025	4	2029						

Exhibit R-2A, RDT&E Project Ju	hibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020													
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (NPE 0603801A / Aviation - Adv DevF12 / Futu						lumber/Name) ure Attack Reconnaissance Aircraft						
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		
F12: Future Attack Reconnaissance Aircraft	-	0.000	398.300	513.501	-	513.501	611.121	430.498	148.163	653.735	Continuing	Continuing		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				

A. Mission Description and Budget Item Justification

The Future Attack Reconnaissance Aircraft (FARA) Project's funding provides for the development of a Capability Set 1 aircraft system within the Future Vertical Lift (FVL) family of systems. FVL Capability Set 1 aircraft will conduct attack/reconnaissance missions in support of the Army's modernization objective of conducting Multi-Domain Operations (MDO). The FARA platform will fill the gap in capability for light weight attack/reconnaissance while significantly increasing speed, range, survivability, and lethality, providing Combatant Commanders with greatly increased tactical, operational and strategic capabilities.

The FVL Capability Set 1 Initial Capabilities Requirements Document was approved in July 2018 under the name Future Attack Reconnaissance Aircraft (FARA). The Acquisition Approach and Determination & Findings for Other Transaction Authority for Prototyping agreements were approved on 1 February 2019 by the Acting Under Secretary of Defense (Acquisition and Sustainment) to execute a Competitive Prototyping effort.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Future Attack Reconnaissance Aircraft	-	375.487	513.501
Description: Design, build, and test competitive prototypes in preparation to rapidly develop and field a Multi-Domain Operations capable attack/reconnaissance vertical lift aircraft.			
FY 2020 Plans: At the completion of the initial design phase, two industry solutions was chosen to continue to final design, build, and test.			
FY 2021 Plans: Continue to complete final prototype design, begin hardware fabrication and software development, begin component/sub-system qualification testing, and begin assembly and Mission Equipment assessment and integration.			
FY 2020 to FY 2021 Increase/Decrease Statement: Fiscal Year (FY) 2021 Research Development Test & Evaluation (RDT&E) funding increased to meet increased requirements for the material purchase, tooling development, and engineering support required to build and integrate two FARA prototypes.			
Title: FY 2020 SBIR/STTR Transfer	-	17.813	-
Description: Funding transferred in accordance with Title 15 USC ?638			
FY 2020 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020											
Appropriation/Budget Activity 2040 / 4				R-1 P I PE 06	r ogram Elen 03801A <i>I Av</i>	nent (Numbe iation - Adv D	r/Name) ev	Project (N F12 / Futur	umber/Na re Attack I	a me) Reconnaissa	nce Aircraft
B. Accomplishments/Planned Pro	ograms (\$ in M	<u>/lillions)</u>						FY	2019	FY 2020	FY 2021
Funding transferred in accordance	with Title 15 U	SC ?638									
FY 2020 to FY 2021 Increase/Dec	rease Statem	ent:									
Funding transferred in accordance	with Title 15 U	SC ?638									
				Accon	nplishments	s/Planned Pro	ograms Sub	ototals	-	393.300	513.501
							FY 2019	FY 2020		·	
Congressional Add: Future Long	Range Assault	Aircraft Uni	versity Partn	ership Effor	t		-	5.000			
FY 2020 Plans: Future Long Range	e Assault Aircr	aft Universit	y Partnershi	p Effort							
				Cong	ressional A	dds Subtotal	s -	5.000			
C. Other Program Funding Summ	ary (\$ in Milli	ons)									
			FY 2021	FY 2021	FY 2021					Cost To	
Line Item	<u>FY 2019</u>	<u>FY 2020</u>	Base	000	<u>Total</u>	FY 2022	FY 2023	<u>FY 2024</u>	FY 2025	<u>Complete</u>	Total Cost
• B47: Future Vertical Lift	93.885	107.590	134.436	-	134.436	178.235	483.442	773.385	871.644	Continuing	Continuing
Remarks The FARA Competitive Prototype e Project B47 Future Vertical Lift, wh Project F12 Future Attack Reconna	effort was initia ich was share iissance Aircra	ted in FY 20 d with Future aft from FY 2	19 with Con Long Rang 2020 and bey	gressional A e Assault Ai /ond.	dd of \$75.40 rcraft. FARA	00 million unde requirements	er Program E s will be exec	Element (PE cuted under) 0603801 PE 06038	A Aviation - 01A Aviatior	Adv Dev 1 - Adv Dev

D. Acquisition Strategy

The Future Attack Reconnaissance Aircraft (FARA) program is executing a streamlined acquisition approach leveraging modern tools, processes, industry innovation, and leveraging efficiencies through the recently implemented Army Cross Functional Teams (CFT) strategy. The aircraft developed under this program will utilize a modular open system approach, which will enable more efficient and cost effective mission equipment integration throughout the lifecycle of the weapon system.

The Army is executing a FARA Competitive Prototyping (CP) effort from FY 2019-2023 using Other Transaction Authority for Prototyping (OTAP) awards to five industry performers and will be executed utilizing a two-phased approach. The scope of this effort includes prototype design and fabrication process refinement, subsystem and representative system level testing, flight control and mission processor software development and testing, development of systems integration labs, development or modification of test fixtures and facilities, preparation of test plans and reports, the generation of airworthiness documentation, and qualification testing of all processes and subsystems within the prototype aircraft.

Phase one is the initial design phase which was awarded in April 2019 and phase two will begin in March 2020 when two of the five vendors are selected for final detailed design and the development, integration and test of a flyable prototype air vehicle. Phase two will culminate with a government flight test evaluation of the FARA Competitive Prototype no later than the end of FY 2023.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0603801A I Aviation - Adv Dev	F12 I Futur	e Attack Reconnaissance Aircraft

The Competitive Prototype effort will inform full FARA Weapon System requirements development process, and will develop the data needed to reduce the risks for full weapon system design, integration, testing, and qualification to be completed during the FARA engineering, manufacturing and development phase.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	/ 2020			
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)ProjectPE 0603801A / Aviation - Adv DevF12 / Fu							(Number/Name) ture Attack Reconnaissance Aircraft				
Management Servic	es (\$ in M	illions)		FY	2019	FY 2020		FY 2021 Base		FY 2	2021 CO	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	-	-		17.813		-		-		-	0.000	17.813	-		
		Subtotal	-	-		17.813		-		-		-	0.000	17.813	N/A		
Product Development (\$ in Millions)				FY :	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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		
Competitive Prototype Execution	C/Various	CCDC AvMC : Redstone Arsenal, AL	-	-		375.487	Mar 2020	513.501	Apr 2019	-		513.501	Continuing	Continuing	Continuing		
		Subtotal	-	-		375.487		513.501		-		513.501	Continuing	Continuing	N/A		
Support (\$ in Million	IS)			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 Services/ Research Studies - Other	Option/ CPFF	TBD : Huntsville, AL	-	-		5.000	Mar 2020	-		-		-	0.000	5.000	-		
		Subtotal	-	-		5.000		-		-		-	0.000	5.000	N/A		
Prior Years		Prior Years	FY	2019	FY 2	2020	FY 2021 Base		FY	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract			
Project Cost Totals -				-		398.300		513.501		-		513.501	Continuing	Continuing	N/A		

Remarks

Under the Other Transaction Authorities for Prototyping (OTAP), five incrementally funded agreements were awarded in April 2019 which have payments based on performance milestones through Fiscal Year (FY) 2023. There will be no additional contract awards or contract options executed. Funding will be incrementally added to the existing awards by modification as negotiated with each performer. In March 2020, two of the five performers will be selected for continued execution and the other three performers will be issued a stop work order and cease to receive additional funding.

NOTE: \$5.000 million Congressional add for Future Long Range Assault Aircraft for university partnerships to be re-aligned and executed on Project B47 / Future Vertical Lift.



Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army	ibit R-4A, RDT&E Schedule Details: PB 2021 Army								
Appropriation/Budget Activity 2040 / 4	R-1 Program E PE 0603801A /	Element (Numbe Aviation - Adv D	r/Name) ev	Project (Number/Name) F12 / Future Attack Reconnaissance A					
:	Schedule Details	6							
	[St	art	E	nd				
Events		Quarter	Year	Quarter	Year				
FVL CFT 2371b Competitive Prototype (CP) Design		3	2019	2	2020				
FVL CFT 2371b CP - Down Select to 2 Performers		2	2020	2	2020				
FVL CFT 2371b CP Build		3	2020	4	2022				
FVL CFT 2371b CP Test		1	2023	4	2023				
Milestone B Documentation Dev. and Coord.		1	2021	2	2024				
Contract Requirement Package Development		1	2021	2	2022				
EMD Request for Proposal Release		2	2022	2	2022				
EMD Proposal Submission/Evaluation		4	2022	1	2024				
Milestone B		2	2024	2	2024				
EMD Contract Award		2	2024	2	2024				
EMD Phase		2	2024	4	2028				
Weapons System CDR		4	2024	4	2024				

Exhibit R-2, RDT&E Budget Item							Date: Febr	uary 2020				
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACD	ation, Army I 0&P)	BA 4: Adva	anced	R-1 Progra PE 060380	a m Elemen 94A / Logisti	t (Number /l cs and Eng	ment - Adv	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	-	18.845	7.339	4.761	-	4.761	7.723	2.416	2.417	2.411	Continuing	Continuing
526: Marine Orien Log Eq Ad	-	3.766	4.001	0.840	-	0.840	2.728	2.416	2.417	2.411	Continuing	Continuing
EW8: Armored Engineer Vehicles	-	3.506	0.000	3.921	-	3.921	4.995	0.000	0.000	0.000	0.000	12.422
G11: Adv Elec Energy Con Ad	-	6.224	3.338	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.562
K39: Field Sustainment Support Ad	-	2.234	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.234
VR8: Combat Service Support Systems - Ad	-	3.115	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.115

Note

Project EW8 - Armored Engineer Vehicles: FY 2021 funding in the amount of \$3.921 million supports a new start effort to develop a robotic capability.

A. Mission Description and Budget Item Justification

This Program Element (PE) supports advanced component development and prototypes of new and improved technologies for combat support and combat service support equipment essential to sustaining combat operations. Advancements in bridging, armored engineer vehicles, electric power generators, material-handling, environmental control, shelter systems, cargo aerial delivery, field service systems, mortuary affairs equipment and petroleum equipment are necessary to improve safety and increase the tactical mobility, operational capability, lethality and survivability on the digital battlefield and to provide for greater sustainment while reducing the logistics support burden. Army Watercraft funding supports initiatives to enhance the seaworthiness, safety, survivability, supportability, energy efficiency, environmental, bulk fuel, water generation, regulatory compliance and reliability of existing systems.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Arr	ny			Da	te: February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4 Component Development & Prototypes (ACD&P)	1: Advanced	R-1 Program El PE 0603804A / L	ement (Number/Name) .ogistics and Engineer E) Equipment - Adv De	V
B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	17.230	7.339	6.124	-	6.124
Current President's Budget	18.845	7.339	4.761	-	4.761
Total Adjustments	1.615	0.000	-1.363	-	-1.363
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	1.615	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	-1.363	-	-1.363

Change Summary Explanation

FY 2021 funding request realized a net reduction of \$1.363 Million due to the following:

Project EW8 was increased \$3.921 Million for a new start to develop robotic capability for Armored Engineer Vehicles.

Project 526 was decreased \$2.083 Million due to low disbursement rate in FY 2019.

Project G11 was decreased by \$3.201 Million to support the Army's modernization priorities in support of the National Defense Strategy.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy						Date: Febr				
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060380 Equipment	am Elemen)4A / Logisti : - Adv Dev	t (Number/ ics and Eng	Project (N 526 / Marir	lumber/Name) ne Orien Log Eq Ad				
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	
526: Marine Orien Log Eq Ad	-	3.766	4.001	0.840	-	0.840	2.728	2.416	2.417	2.411	Continuing	Continuing	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

Note

FY 2021 Program funding reduced \$1,363K was due to underexecution in FY 2019. This was a result of contract award delays, contractor delay, billings, etc.

A. Mission Description and Budget Item Justification

Project 526 Marine Orientation Logistics and Engineering Advanced Development supports 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.

In general, this project supports efforts and studies for advanced component development, including prototypes of equipment and sub-systems 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 addition, funded efforts will address critical gaps in these areas for the legacy fleet, while at the same time researching, developing and testing emergent technologies. To support future acquisitions and future fleet planning, funding efforts will include conducting trade studies, Business Case Analyses to inform the requirement development process, and support Analysis of Alternatives (AoA). The funding enables Army's compliance with the National Defense Authorization Act of 1996 and 502(6) of the Clean Water Act and compliance with Environmental protection Agency (EPA) emission standards.

FY 2021 RDTE dollars in the amount of \$0.841 million supports modernization of the legacy fleet by investigating technology insertions, including, but not limited to: force protection, condition based maintenance, vessel electronics, autonomous operations and other emerging technologies. 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.

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.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2021	FY 2021
	FY 2019	FY 2020	Base	000	Total
Title: At Sea Transfer Technology	3.124	1.004	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army				Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/ PE 0603804A / Logistics and Eng Equipment - Adv Dev	Name) nineer	Project (N 526 / Marir	umber/Nan he Orien Log	n e) g Eq Ad	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Description: At Sea Transfer Technology enables roll on and roll off (RO/RO) and causeway transport of vehicles and equipment to the beach or shore. The development of a Service Life Extension Program (SLEP) for the Modular War Ferry (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are principle working platforms in the Modular Causeway System (CF) which are platforms (C	capability from vessels at sea current effort serves to inform ping Tug (MWT) and Causeway tem (MCS).					
FY 2020 Plans: Perform testing of MWT/CF SLEP prototype and to complete Technical Data P Maritime workforce.	ackage for a reference for the					
FY 2020 to FY 2021 Increase/Decrease Statement: The decrease is due to MWT/CF SLEP finalizing testing and transitioning to Pr	ocurement funding.					
Title: Environmental Compliance Projects		-	0.038	0.095	-	0.095
Description: Environmental projects enable compliance with requirements as National Discharge Standards (UNDS) and Environmental Protection Agency (EPA reviews the UNDS Code of Federal Regulations (CFR) language in five-yet three batches (types of discharge). This is an ongoing assessment of statutory result in material solution change.	defined under in the law Uniform EPA) emissions standards. The ear increments separated into / language which may or may not					
FY 2020 Plans: Identification of Environmental Compliance Technologies IAW evolving statutor and ensure ships are compliant. Will also fund Navy efforts for UNDS analysis	ry and regulatory requirements and committee representation.					
FY 2021 Base Plans: Identification of Environmental Compliance Technologies IAW evolving statutor and ensure ships are compliant. This accomplishment will also fund Navy effor committee representation.	ry and regulatory requirements rts for UNDS analysis and					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding increase to support establishing Performance standards for Batch Thr Implementation of DOD instruction for the Mariners.	ee discharges and develop					
Title: Force Protection Capability		-	0.478	0.445	-	0.445
Description: Army Watercraft Systems (AWS) Force Protection capability is lir Current efforts include development of gunner station and weapon station loca	nited to defensive measures. tions, integration of Common					

PE 0603804A: Logistics and Engineer Equipment - Adv D... Army

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army				Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/ PE 0603804A / Logistics and Eng Equipment - Adv Dev	Name) iineer	Project (N 526 / Marin	umber/Nam ne Orien Log	ne) g Eq Ad	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Remotely Weapon Station (CROWS) and non-lethal Escalation of Force (EoF). white light, green dazzler, an acoustic hailing device, percussion grenades, and (FLIR) cameras.	The EoF capability includes Forward Looking Infra-Red					
FY 2020 Plans: Will design, Install, and test CROWS aboard LCU and LSV 7 class vessels.						
FY 2021 Base Plans: Provide support to design, install, and test CROWS aboard LCU watercraft fleet include, but are not limited to, white light, green dazzler, an acoustic hailing dev Electro-Optical / Infrared (EO/IR) capabilities.	t.The EoF capabilities could ice, percussion grenades, and					
FY 2020 to FY 2021 Increase/Decrease Statement: Additional funding is to design and install the prototype and proof for CROWS a	board the LCU 2000 fleet.					
Title: Army Watercraft Program Support		0.642	0.278	0.300	-	0.300
Description: Matrix Salary Support includes Program Management and System to manage the program projects and provide contractor oversight. It also include training and other Government costs required to retain a professional acquisition	n Engineering resources required les benefits, travel, personnel n workforce.					
FY 2020 Plans: Will provide MWT Engineering test support as well as engineering and Naval su	pport for the Fleet.					
FY 2021 Base Plans: Provide MWT Engineering test support as well as engineering and Naval support	rt for the Fleet.					
FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to additional ongoing test support requirements from FY 2019 to F	TY 2021.					
<i>Title:</i> Trade Studies and Business Analyses		-	1.008	-	-	-
Description: Conduct Affordability and Feasibility Studies for concept developm future vessel platforms.	nent concept development for					
FY 2020 Plans: Support the following Feasibility Studies for future vessel platforms: Initiation of analysis and initiation of electrical power studies to support Command, Control,	human factor engineer Communications, Computers,					

Exhibit R-2A, RDT&E Project Justi	fication: PB	2021 Army							Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4				R-1 P PE 06 <i>Equip</i>	rogram Ele 03804A / Lo ment - Adv I	ment (Numbe ogistics and Er Dev	r /Name) ngineer	Project (N 526 / Marii	umber/Nai ne Orien Lo	me) og Eq Ad	
B. Accomplishments/Planned Prog	grams (\$ in N	<u>/lillions)</u>					FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Intelligence, Surveillance and Recon vessels.	naissance (C	4ISR) upgra	ades and joir	nt operation	capabilities	or legacy					
FY 2020 to FY 2021 Increase/Decre Decrease in budget affects the ability	ease Statem / to properly f	ent: fund the trac	le studies ar	nd analysis c	of future vess	el platforms.					
Title: Electro-Optical / Infrared (EO/I	R) Integratior	n Kits					-	1.063	-	-	-
Description: Requirement is on hold requirement.	l for FY 2020	-FY 2021.	Funding will	be moved to	o MWT - At S	Sea Transfer					
Integration of EO/IR maritime infrare capability greatly increases the ability threat day and night that they encour	d imaging sys y for the vess nter.	stem for mai sel crews to	ritime use or identify and	n LSV and L0 track smugg	CU vessels. Iers, terroris	The EO/IR ts, or any othe	er				
FY 2020 Plans: N/A Base RDTE funds.											
FY 2020 to FY 2021 Increase/Decre Development of A-kit integration des 2021.	ease Statem igns on the L	ent: SV and LCL	J in FY 2020	. No further	design requ	irements in F`	Y				
Title: FY 2020 SBIR/STTR Transfer							-	0.132	-	-	-
Description: Funding transferred in	accordance v	with Title 15	USC 638								
FY 2020 Plans: Funding transferred in accordance w	ith Title 15 U	SC 638									
FY 2020 to FY 2021 Increase/Decre Funding transferred in accordance w	ease Statem ith Title 15 U	ent: SC 638									
			Accomplis	hments/Pla	nned Progra	ams Subtotal	s 3.766	4.001	0.840) –	0.840
C. Other Program Funding Summa	ry (\$ in Milli	ons <u>)</u>									
		-	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>					<u>Cost To</u>	
<u>Line Item</u> • MA4501: <i>MODIFICATION KITS</i>	<u>FY 2019</u> 15.693	<u>FY 2020</u> 48.821	<u>Base</u> 19.386	<u>000</u> -	<u>Total</u> 19.386	<u>FY 2022</u> 19.819	<u>FY 2023</u> 21.331	<u>FY 2024</u> 7.385	<u>FY 2025</u> 10.849	Complete Continuing	Total Cost Continuing
PE 0603804A: Logistics and Enginee	r Equipment	- Adv D		UNCLAS	SIFIED					Г	
Army	4. 1			Page 6	of 39		R-1 Line #	91			283

Exhibit R-2A, RDT&E Project Justi	fication: PB	2021 Army							Date: Fel	oruary 2020	
Appropriation/Budget Activity				R-1 P	rogram Elen	nent (Numb	er/Name)	Project (N	Number/Na	ime)	
2040 / 4				PE 06 <i>Equip</i>	03804A I Lo ment - Adv D	gistics and E Dev	Engineer	526 / Mar	ine Orien L	og Eq Ad	
C. Other Program Funding Summa	ry (\$ in Milli	ons <u>)</u>									
			FY 2021	FY 2021	FY 2021					Cost To	
Line Item	<u>FY 2019</u>	<u>FY 2020</u>	Base	000	<u>Total</u>	FY 2022	FY 2023	FY 2024	<u>FY 2025</u>	<u>Complete</u>	Total Cost
 MA4502: INSTALLATION 	12.306	18.438	5.251	-	5.251	4.506	4.718	4.584	4.633	Continuing	Continuing
OF MODIFICATIONS											
 M11101: Army Watercraft Esp 	8.508	35.194	40.910	-	40.910	36.608	33.922	30.510	30.511	0.000	216.163
 ML5355: Items Less 	9.385	6.920	1.844	-	1.844	-	9.933	22.697	17.702	0.000	68.481
Than \$5.0M (Float/Rail)											
Remarks											

FY 2019 Accomplishments:

-Completed CDR for MWT/CF SLEP.

-Continue Escalation of Force (EOF) development on LSV 7 Class CROWS.

-Approved ECP MWO for EOF (development) LSV 1 Class CROWS.

-Completed identification of Environmental Compliance Technologies IAW evolving statutory and regulatory requirements.

D. Acquisition Strategy

Leverage government and public research centers Ground Vehicle Systems Center (GVSC), Naval Surface Warfare Center (NSWC) Philadelphia, AWS System Technical Support (STS) contractor (McKean Defense) and known public research institutes (Battelle) along with associated contract mechanisms to prototype, test, and evaluate component technologies that may be applicable to the current and future Army Watercraft fleet.

Project C	ost Analysis: PB 2	021 Arm	y								Date:	February	/ 2020	
et Activity	/				R-1 Pro PE 060 Equipm	ogram Ele 3804A / L bent - Adv	ement (N .ogistics a Dev	lumber/N and Engin	ame) eer	Project 526 / <i>M</i>	(Numbe arine Orie	r/Name) en Log Eq	Ad	
es (\$ in M	lillions)		FY	2019	FY	2020	FY : Ba	2021 ase	FY 2	2021 CO	FY 2021 Total			
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
TBD	Various : Various	-	-		0.132		-		-		-	0.000	0.132	-
	Subtotal	-	-		0.132		-		-		-	0.000	0.132	N/A
nt (\$ in M	illions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	FY 2021 Total			
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
MIPR	TARDEC : Warren, MI	3.268	-		0.478	Feb 2020	0.445	Nov 2020	-		0.445	Continuing	Continuing	-
SS/CPFF	TARDEC DTIC - I, Battelle : Fort Belvoir, VA	4.374	3.124	Feb 2019	1.004	Nov 2019	-		-		-	0.000	8.502	-
MIPR	Carderock : Maryland and Pennsylvania	3.281	-		0.038	Dec 2019	0.095	Nov 2020	-		0.095	Continuing	Continuing	-
TBD	TBD : TBD	-	-		1.008	Feb 2020	-		-		-	0.000	1.008	-
MIPR	TARDEC : Warren, MI	-	-		1.063	Oct 2019	-		-		-	0.000	1.063	-
	Subtotal	10.923	3.124		3.591		0.540		-		0.540	Continuing	Continuing	N/A
s)			FY	2019	FY 2	2020	FY : Ba	2021 ase	FY 2	2021 CO	FY 2021 Total			
Contract Method & Type MIPR	Performing Activity & Location Detroit Arsenal PMs, TARDEC,	Prior Years 1.427	Cost 0.642	Award Date Dec 2018	Cost 0.278	Award Date Dec 2019	Cost 0.300	Award Date Dec 2020	Cost -	Award Date	Cost 0.300	Cost To Complete	Total Cost	Target Value of Contract
	Project C t Activity es (\$ in M Contract Method & Type TBD t (\$ in M Contract Method & Type MIPR SS/CPFF MIPR SS/CPFF	Project Cost Analysis: PB 2 t Activity as (\$ in Millions) Contract Method & Type Performing Activity & Location TBD Various : Various Subtotal tt (\$ in Millions) Contract Method & Type Performing Activity & Location MIPR TARDEC : Warren, MI SS/CPFF TARDEC DTIC - I, Battelle : Fort Belvoir, VA MIPR Carderock : Maryland and Pennsylvania TBD TARDEC : Warren, MI TBD TARDEC : Warren, MI SS/CPFF TARDEC DTIC - I, Battelle : Fort Belvoir, VA MIPR Carderock : Maryland and Pennsylvania TBD TBD : TBD MIPR TARDEC : Warren, MI Solutotal Subtotal	Project Cost Analysis: PB 2021 Armst Activityt Activityt ActivityContract Method & TypePerforming Activity & LocationTBDVarious : Various-SubtotalTBDVarious : Various-Contract Method & TypePerforming Activity & LocationPrior YearsMIPRTARDEC : Warren, MI3.268SS/CPFFTARDEC DTIC - I, Battelle : Fort Belvoir, VA4.374MIPRCarderock : Maryland and Pennsylvania3.281TBDTBD : TBD-MIPRTARDEC : Warren, MI3.281MIPRTARDEC : Warren, MI-MIPRTARDEC : Warren, MI-MIPRTARDEC : Warren, MI-MIPRTARDEC : Warren, MI-MIPRDetroit Arsenal PMs, TARDEC, NAVSEA Carderock :Prior Years	Project Cost Analysis: PB 2021 Army t Activity t Activity FY Contract Method Method Performing Activity & Location Prior Years Cost TBD Various : Various - - Subtotal - TBD Various : Various - Subtotal - Contract Method Performing Activity & Location Prior Years Cost MIPR TARDEC : Warren, MI 3.268 - - SS/CPFF TARDEC DTIC - I, Battelle : Fort Belvoir, VA 3.281 - - MIPR Carderock : Maryland and Pennsylvania 3.281 - - - TBD TBD : TBD - - - - - - - MIPR TARDEC : Warren, MI - - - - - - - MIPR TARDEC : Warren, MI - - - - - - - - - - M	Project Cost Analysis: PB 2021 Army t Activity t Activity t Activity FY 2019 Contract Method & Performing Activity & Location Prior Years Cost Award Date TBD Various : Various - - - - t (\$ in Millions) FY 2019 Contract Method Performing Activity & Location Prior Years Cost Award Date TBD Various : Various Prior Years Cost Award Date Other Subtotal - - TARDEC : Warren, MI 3.268 - Award Date SS/CPFF TARDEC DTIC - I, Battelle : Fort Belvoir, VA 4.374 3.124 Feb 2019 MIPR Carderock : Maryland and Pennsylvania 3.281 - - - MIPR TARDEC : Warren, MI 3.281 - - - MIPR TARDEC : Warren, MI 3.124 Feb 2019 - Subtotal 10.923 3.124 - <th< td=""><td>Project Cost Analysis: PB 2021 Army R-1 Pro PE 060 Equipm FY 2019 FY 2009 FY 2019 FY 2019 S (\$ in Millions) FY 2019 FY 2019 Contract Method & Type Performing Activity & Location Prior Years Award Date Cost TBD Various : Various - - 0.132 TBD Various : Various - - 0.132 TBD Performing Activity & Location Prior Years Cost Award Date Cost MIPR TARDEC DTIC - I, Battelle : Fort Belvoir, VA 3.268 - 0.0478 MIPR Carderock : Maryland and Pennsylvania 3.281 - 1.008 MIPR TARDEC : Warren, MIPR 3.124 Feb 2019 1.004 3.281 - 1.008 MIPR TARDEC : Warren, MIPR 3.124 Sasta 3.124 3.591 59 FY 2019</td><td>Project Cost Analysis: PB 2021 Army R-1 Program Ele PE 0603804A / L Equipment - Adv FY 2019 FY 2020 Contract Method Performing Activity & Location Prior Years Award Date Award Cost Award Date TBD Various : Various - 0.132 TBD Various : Various - 0.132 TABD Various : Various - 0.132 Contract (\$ in Millions) FY 2019 FY 2020 Contract Method Award Date Award Date On 132 Contract Method Performing Activity & Location Years Cost Award Date Sign colspan="4">Award Date Award Cost Award Date Sign colspan="4">Sign colspan="4">Award Date Award Cost Award Date Sign colspan="4">Sign colspan="4">Sign colspan="4">Sign colspan="4">Sign colspan="4">Sign colspan="4">Sign colspan="4">Si</td><td>Project Cost Analysis: PB 2021 Army R-1 Program Element (N PE 0603804A I Logistics is Equipment - Adv Dev FY 2019 FY 2020 FY 2019 FY 2019 FY 2020 FY 2019 FY 2019 FY 2020 FY 2019 Contract Method Performing Prior Award Cost Award Cost TBD Various : Various - - 0.132 - Contract Method Performing Performing Frior Award Cost Award Artivity & Location Years Cost Award Cost Millions) FY 2019 FY 2020 FY 201</td><td>Project Cost Analysis: PB 2021 ArmyR-1 Program Element (Number/N PE 0603804A / Logistics and Engine Equipment - Adv DevState in Millions)FY 2019FY 2020FY 2021 BaseContract Method A trivity & LocationPrior YearsCost Award DateAward CostAward DateAward CostAward DateAward CostAward DateCost Award DateTBD Various: VariousPrior SubtotalAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateContract Method & TARDEC : Warren, MI3.268-Award CostAward CostAward CostAward CostAward CostMIPR TARDEC DTIC - Is Batelie: Fort Belvoir, VAID TBDFY 2019MIPR TARDEC DTIC - Is Batelie: Fort Belvoir, VAID TBDID TBD</td><td>Project Cost Analysis: PB 2021 Army R-1 Program Element (Number/Name) PE 0603804A / Logistics and Engineer Equipment - Adv Dov St \$in Millions) FY 2019 FY 2020 Base OV Contract Method & Type Award Activity & Location Prior Award Date Cost Cost C</td><td>Project Cost Analysis: PB 2021 Army R-1 Program Element (Number/Name) PE 0603804A / Logistics and Engineer Project 526 / M State Signame Contract FY 2019 FY 2021 Base FY 201 Contract Prior Activity & Location Prior Cost Award <th< td=""><td>Project Cost Analysis: PB 2021 Army Date: t Activity Project (Numbe PE 6003804A / Logistics and Engineer) Project (Numbe S26 / Marine Orie S26 / Ma</td><td>Project Cost Analysis: PB 2021 Army Date: February Date: February Paties: February t Activity Image: February Paties: February Paties: February t Activity Set Paties: Pebruary Paties: February Paties: February t Activity Set Paties: Pebruary Paties: February Set Imary Paties: Pebruary Paties: February Set Imary Paties: February Set Imary Project (Number/Name) Set Imary Set Imary <th< td=""><td>Project Cost Analysis: PB 2021 Army Date: February 2020 t Activity Project (Number/Amer) FE 6003004A / Logistics and Engineer Project (Number/Amer) FY 2021 Project (Number/Amer) FY 2021</td></th<></td></th<></td></th<>	Project Cost Analysis: PB 2021 Army R-1 Pro PE 060 Equipm FY 2019 FY 2009 FY 2019 FY 2019 S (\$ in Millions) FY 2019 FY 2019 Contract Method & Type Performing Activity & Location Prior Years Award Date Cost TBD Various : Various - - 0.132 TBD Various : Various - - 0.132 TBD Performing Activity & Location Prior Years Cost Award Date Cost MIPR TARDEC DTIC - I, Battelle : Fort Belvoir, VA 3.268 - 0.0478 MIPR Carderock : Maryland and Pennsylvania 3.281 - 1.008 MIPR TARDEC : Warren, MIPR 3.124 Feb 2019 1.004 3.281 - 1.008 MIPR TARDEC : Warren, MIPR 3.124 Sasta 3.124 3.591 59 FY 2019	Project Cost Analysis: PB 2021 Army R-1 Program Ele PE 0603804A / L Equipment - Adv FY 2019 FY 2020 Contract Method Performing Activity & Location Prior Years Award Date Award Cost Award Date TBD Various : Various - 0.132 TBD Various : Various - 0.132 TABD Various : Various - 0.132 Contract (\$ in Millions) FY 2019 FY 2020 Contract Method Award Date Award Date On 132 Contract Method Performing Activity & Location Years Cost Award Date Sign colspan="4">Award Date Award Cost Award Date Sign colspan="4">Sign colspan="4">Award Date Award Cost Award Date Sign colspan="4">Sign colspan="4">Sign colspan="4">Sign colspan="4">Sign colspan="4">Sign colspan="4">Sign colspan="4">Si	Project Cost Analysis: PB 2021 Army R-1 Program Element (N PE 0603804A I Logistics is Equipment - Adv Dev FY 2019 FY 2020 FY 2019 FY 2019 FY 2020 FY 2019 FY 2019 FY 2020 FY 2019 Contract Method Performing Prior Award Cost Award Cost TBD Various : Various - - 0.132 - Contract Method Performing Performing Frior Award Cost Award Artivity & Location Years Cost Award Cost Millions) FY 2019 FY 2020 FY 201	Project Cost Analysis: PB 2021 ArmyR-1 Program Element (Number/N PE 0603804A / Logistics and Engine Equipment - Adv DevState in Millions)FY 2019FY 2020FY 2021 BaseContract Method A trivity & LocationPrior YearsCost Award DateAward CostAward DateAward CostAward DateAward CostAward DateCost Award DateTBD Various: VariousPrior SubtotalAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateContract Method & TARDEC : Warren, MI3.268-Award CostAward CostAward CostAward CostAward CostMIPR TARDEC DTIC - Is Batelie: Fort Belvoir, VAID TBDFY 2019MIPR TARDEC DTIC - Is Batelie: Fort Belvoir, VAID TBDID TBD	Project Cost Analysis: PB 2021 Army R-1 Program Element (Number/Name) PE 0603804A / Logistics and Engineer Equipment - Adv Dov St \$in Millions) FY 2019 FY 2020 Base OV Contract Method & Type Award Activity & Location Prior Award Date Cost Cost C	Project Cost Analysis: PB 2021 Army R-1 Program Element (Number/Name) PE 0603804A / Logistics and Engineer Project 526 / M State Signame Contract FY 2019 FY 2021 Base FY 201 Contract Prior Activity & Location Prior Cost Award Cost Award <th< td=""><td>Project Cost Analysis: PB 2021 Army Date: t Activity Project (Numbe PE 6003804A / Logistics and Engineer) Project (Numbe S26 / Marine Orie S26 / Ma</td><td>Project Cost Analysis: PB 2021 Army Date: February Date: February Paties: February t Activity Image: February Paties: February Paties: February t Activity Set Paties: Pebruary Paties: February Paties: February t Activity Set Paties: Pebruary Paties: February Set Imary Paties: Pebruary Paties: February Set Imary Paties: February Set Imary Project (Number/Name) Set Imary Set Imary <th< td=""><td>Project Cost Analysis: PB 2021 Army Date: February 2020 t Activity Project (Number/Amer) FE 6003004A / Logistics and Engineer Project (Number/Amer) FY 2021 Project (Number/Amer) FY 2021</td></th<></td></th<>	Project Cost Analysis: PB 2021 Army Date: t Activity Project (Numbe PE 6003804A / Logistics and Engineer) Project (Numbe S26 / Marine Orie S26 / Ma	Project Cost Analysis: PB 2021 Army Date: February Date: February Paties: February t Activity Image: February Paties: February Paties: February t Activity Set Paties: Pebruary Paties: February Paties: February t Activity Set Paties: Pebruary Paties: February Set Imary Paties: Pebruary Paties: February Set Imary Paties: February Set Imary Project (Number/Name) Set Imary Set Imary <th< td=""><td>Project Cost Analysis: PB 2021 Army Date: February 2020 t Activity Project (Number/Amer) FE 6003004A / Logistics and Engineer Project (Number/Amer) FY 2021 Project (Number/Amer) FY 2021</td></th<>	Project Cost Analysis: PB 2021 Army Date: February 2020 t Activity Project (Number/Amer) FE 6003004A / Logistics and Engineer Project (Number/Amer) FY 2021 Project (Number/Amer) FY 2021

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army										Date: February 2020						
Appropriation/Budg 2040 / 4	et Activity	,				R-1 Pro PE 060 Equipm	ogram Ele 3804A / L aent - Adv	e ment (N .ogistics Dev	Number/N and Engin	ame) eer	Project 526 / M	(Number/Name) arine Orien Log Eq Ad				
Support (\$ in Million	is)		ſ	FY 2	:019	FY 2	2020	FY	2021 ase	FY : O	2021 CO	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 Cost Date		Cost To Complete	Total Cost	Target Value of Contract	
		Maryland, Warren, MI														
		Subtotal	1.427	0.642		0.278		0.300		-		0.300	Continuing	Continuing	N/A	
			Prior Years	FY 2	019	FY 2	2020	FY Bi	2021 ase	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
		Project Cost Totals	12.350	3.766		4.001		0.840		-		0.840	Continuing	Continuing	N/A	

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy	/																			Dat	e: F	ebr	uary	2020)		
Appropriation/Budget Activity 2040 / 4								R-1 Program Element (Number/Name)Project (Number/Name)PE 0603804A / Logistics and Engineer526 / Marine Orien Log Eq AdEquipment - Adv Dev526 / Marine Orien Log Eq Ad																				
		EV	1 20	10	1	E.	V 20	20		E	(20	21	I	EV	2022	,		EV 2	023			EV	201	24		EV 2	0025	٦
Event Name	1	2		3 4	1	г 2	1 20	3 4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3 4	_
Army Watercraft Program Support																												
Force Protection: Common Remotely Operated Weapon Station																												
Force Protection: CROWS on LSV Class																												
Force Protection: CROWS on LCU Class																												
At Sea Transfer Technology (MCS)																												
Modular Warping Tug (MWT) / Causeway Ferry (CF)																												
MWT / CF - SLEP Prototype and Proof Concept																												
MWT / CF - SLEP Testing																												
Environmental Compliance																												
Uniformed National Discharge Standards (UNDS)																												
UNDS Batch 2																												
UNDS Batch 3																2												
Trade Studies and Business Analyses																												
													1												1			

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603804A <i>I Logistics and Engineer</i> <i>Equipment - Adv Dev</i>	Project (N 526 / Marii	umber/Name) ne Orien Log Eq Ad

Schedule Details

	Sta	art	E	nd
Events	Quarter	Year	Quarter	Year
Army Watercraft Program Support	1	2018	4	2025
Force Protection: Common Remotely Operated Weapon Station (CROWS)	1	2018	4	2025
Force Protection: CROWS on LSV Class	1	2018	2	2022
Force Protection: CROWS on LCU Class	1	2018	4	2023
At Sea Transfer Technology (MCS)	1	2018	1	2021
Modular Warping Tug (MWT) / Causeway Ferry (CF)	1	2018	1	2021
MWT / CF - SLEP Development Contract	4	2018	4	2018
MWT / CF - SLEP Prototype and Proof Concept	1	2018	4	2020
MWT / CF - SLEP Testing	1	2020	4	2020
Environmental Compliance	1	2018	4	2025
Uniformed National Discharge Standards (UNDS)	1	2018	4	2025
UNDS Batch 2	4	2020	4	2020
UNDS Batch 3	4	2022	4	2022
Trade Studies and Business Analyses	4	2019	4	2025

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	vrmy							Date: Febr	ruary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060380 Equipment	am Elemen 04A I Logisti t - Adv Dev	t (Number/ ics and Eng	Name) ineer	Project (N EW8 / Arm	umber/Nan ored Engin	ne) eer Vehicles	
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
EW8: Armored Engineer Vehicles	-	3.506	0.000	3.921	-	3.921	4.995	0.000	0.000	0.000	0.000	12.422
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
<u>Note</u> This is a new start in FY2021.												

FY 2021 funding in the amount of \$3.921 million supports a new start effort to develop a robotic capability for Armored Engineer Vehicles.

A. Mission Description and Budget Item Justification

This project supports a new start effort for the prototype development, test and evaluation of a robotic capability Remote Control System (RCS) for the Assault Breacher Vehicle (ABV), to include prototype fabrication, developmental testing, operational testing and logistics demonstration / user test events. This project also supports live fire test and evaluation, initial operational test and evaluation qualification testing of the Joint Assault Bridge (JAB).

Funding supports modernization of Army Bridging and Armored Engineer Vehicle fleets by investigating technology insertions including, but not limited to: condition based maintenance, increased military load capacities, autonomous operations and other emerging technologies. Funding also supports developing initial prototypes and testing 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: Assault Breacher Vehicle (ABV) Remote Control System (RCS)	-	-	3.921	-	3.921
FY 2021 Base Plans: New start effort. Funding supports prototype development and fabrication of a Remote Control System (RCS) capability for the Assault Breacher Vehicle (ABV). Funding also provides for Systems Engineering Project Management (SEPM) matrix functional support.					
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2020 to FY 2021 increase due to first year of RDT&E funding for ABV RCS program. New start effort.					
Title: Joint Assault Bridge (JAB)	2.221	-	-	-	-
Description: This effort funds the development and testing of the Joint Assault Bridge (JAB). The JAB provides the Army Mobility Augmentation Companies (MACs) and Armor Brigade Combat Teams (ABCTs) Brigade					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army						Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0603804 <i>,</i> <i>Equipment -</i>	n Elem A / Log Adv De	ent (Numbe nistics and En ev	r/ Name) gineer	Project (N EW8 / Arm	umber/Nai ored Engin	me) beer Vehicle	s
B. Accomplishments/Planned Programs (\$ in Millions)				FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Engineer Battalions (BEBs) with a survivable, deployable and sustainable heav JAB System will provide a Gap Crossing Capability to cross wet or dry gaps ar provide freedom of maneuver on the battlefield and keep pace with Abrams AB	vy assault brid nd 3CT operation:	ging ca 3.	apability. The					
<i>Title:</i> Armored Mobile Earthmover (AME)		1.285	-	-	-	-		
Description: This effort funds the development and testing of the Armored Mo will replace the M9 Armored Combat Earthmover and will be primarily a mobilit units during attacks and movements to contact. The AME will provide hasty su capabilities to the maneuver units until more survivability and counter-mobility a support the maneuver force?s defenses. It will operate with primarily medium will be capable of supporting all combat forces and the full range of military operation.	E). AME ineuver er-mobility vard to ed forces but							
Accomplishme	nts/Planned F	rograi	ms Subtotals	s 3.506	-	3.921	-	3.921
C. Other Program Funding Summary (\$ in Millions) FY 2021 FY	(2021 FY 2	021					Cost To	
Line Item FY 2019 FY 2020 Base	000 1	otal	<u>FY 2022</u>	FY 2023	FY 2024	<u>FY 2025</u>	Complete	Total Cost
• GZ3001: Joint Assault Bridge 119.147 205.517 142.178	- 142	178	143.054	220.376	245.365	196.252	Continuing	Continuing
• G62925: Assault Breacher Venicle 62.107 31.697 19.500 Remarks	- 19	500	20.171	20.041	1.171	-	Continuing	Continuing

D. Acquisition Strategy

Funding will support RDT&E efforts for testing and follow-on production of Assault Bridging system. The Assault Breacher Vehicle (ABV) Remote Control System (RCS) program will pursue a competitive prototype development and testing strategy with multiple vendors to select an RCS materiel solution for production and integration into the ABV system.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Equipm	ogram Ele 03804A / L nent - Adv	ement (N .ogistics a Dev	lumber/N and Engin	ame) eer	Project EW8 / A	: (Numbe Armored E	r/Name) Engineer \	/ehicles	
Management Service	es (\$ in M	lillions)		FY	2019	FY	2020	FY : Ba	2021 ase	FY 2	2021 CO	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 Functional Support	MIPR	Various : Various	0.779	0.150	Oct 2018	-		0.500	Dec 2020	-		0.500	0.000	1.429	-
		Subtotal	0.779	0.150		-		0.500		-		0.500	0.000	1.429	N/A
Product Developmer	nt (\$ in M	illions)		FY	2019	FY	2020	FY : Ba	2021 ase	FY 2 O(2021 CO	FY 2021 Total]		1
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
AME Analysis of Alternatives (AOA)	C/FFP	TBD : TBD	-	1.285	Jan 2019	-		-		-		-	0.000	1.285	-
JAB Force Protection Development and Fabrication	SS/FFP	DRS SUSTAINMENT SYSTEMS, INC. : SAINT LOUIS, MO	2.084	-		-		-		-		-	0.000	2.084	-
ABV RCS Prototype Development and Fabrication	TBD	TBD : TBD	-	-		-		3.421	May 2021	-		3.421	0.000	3.421	-
	-	Subtotal	2.084	1.285		-		3.421		-		3.421	0.000	6.790	N/A
Test and Evaluation	(\$ in Milli	ions)		FY	2019	FY	2020	FY : Ba	2021 ase	FY 2 O(2021 CO	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
JAB Initial Operational Test & Evaluation (IOTE)	MIPR	Operational Test Command : Ft. Hood, TX	3.143	2.071	Feb 2020	-		-		-		-	0.000	5.214	-
JAB Production Qualification Testing (PQT)	MIPR	Aberdeen Test Center : Aberdeen Proving Grounds, MD	3.936	-		-		-		-		-	0.000	3.936	-
JAB Prototype Live Fire Validation	MIPR	Aberdeen Test Center : Aberdeen	1.500	-		-		-		-		-	0.000	1.500	-

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Exhibit R-3, RDT&E	Project Co	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Pro PE 0603 Equipm	gram El 3804A <i>I L</i> ent - Adv	ement (N .ogistics a . Dev	umber/N and Engin	ame) eer	Project EW8 / A	(Number Armored E	r/ Name) Engineer V	ehicles	
Test and Evaluation	(\$ in Milli	ons)		FY 2	2019	FY 2	020	FY 2 Ba	2021 se	FY 2 OC	2021 CO	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
		Proving Grounds, MD													
JAB Logistics Demonstration	TBD	Army Operational Test Command (AOTC) : Ft. Hood, TX	0.270	-		-		-		-		-	0.000	0.270	-
		Subtotal	8.849	2.071		-		-		-		-	0.000	10.920	N/A
	Prior Years	FY 2	2019	FY 2	020	FY 2 Ba	2021 se	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
		Project Cost Totals	11.712	3.506		0.000		3.921		-		3.921	0.000	19.139	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021	Army	/																				[Date	e: F	ebru	lary	202	20			
Appropriation/Budget Activity 2040 / 4					R-1 PE 0 <i>Equi</i>	Prog 6038 pme	gran 804 nt -	n Ele A / L Adv	emer .ogist Dev	nt (N tics	Num and	nber I Eng	/ Na i gine	me) er		P E	roj W8	ect (/ Al	(Nu rmc	ored	er/N	lam gine	e) er V	/ehi	icles	;					
		FY	(20	19		FY	202	20		F١	(20)	21		F	Y 20)22			FY	20	23			FY	202	4		F	Y 2	025	
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	2	3	4	1	2	3	4		1	2	3	4	1	1	2	3	4
Joint Assault Bridge Development & Testing																															
Joint Assault Bridge Live Fire Remediation Testing		JAB	LF Re	emediatic	n Tes	sting																									
Joint Assault Bridge Production Qualification Test	JAB F	ναт																													
Joint Assault Bridge Logistics Demonstration	JAB I	.og De	emo																												
Joint Assault Bridge Initial Operational Test & Eval			JAB K	OT&E																											
Joint Assault Bridge Confidence Berm Test					JAL	вст																									
Joint Assault Bridge Initial Operational Test & Eval Retest							JAB	IOT&E	Retest																						
Joint Assault Bridge Conditional Material Release									MR																						
Joint Assault Bridge Full Material Release													JA	5 AB FM	R																
Joint Assault Bridge Low Rate Initial Production	JAB I	.RIP																													
Joint Assault Bridge Full Rate Production Decision										JAB	3 FRP C	ecision																			
Joint Assault Bridge Full Rate Production											JAB FI	٩P																			
Armored Mobile Earthmover (AME)																															

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	۲m	/																				Da	te:	Feb	ruar	ry 2	202	0			
Appropriation/Budget Activity 2040 / 4							R-1 ΡΕ <i>Ε</i> qι	Prog 0603 Jipme	gra r 8804 e <i>nt -</i>	m E IA / · Ad	lemer Logis v Dev	nt (tics	Nur an	nbo d E	er/N ingir	l am neer	e)	l	Pro EW	jec 8 /	t (N Arn	lum nore	ber d E	r/ Na Engir	me) neer	· Ve	ehic	les			
Γ												-																			_
Event Name	1	FY	2019	1	F 2	Y 20)20 3 4	1	F ۱	Y 20)21 3 4	-	F	=Y : 2	3	2 4	1	F`	Y 2	023 3	4	1	F`	Y 20	24	4	1	F)	(20	25	4
AME Analysis of Alternatives (AOA)		AME	AOA		-		<u> </u>				<u>, </u>			-	5	-			· .	5	-										<u></u>
Assault Breacher Vehicle (ABV) Remote Control System (RC	5)																														
Request for Prototype Proposals								2 RFP																							
Prototype Design								R	CS Des	sign																					
Prototype Awards											vd																				
Prototype Fabrication											Fab																				
Prototype Competitive Testing													Test	:																	
Production Source Selection																	Downs	selec	ot Dee	cision	1										
Contract Award																		6 Aw	d												
Developmental Test / Operational Test																			DT	T/OT/	LFT&	E									

hibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Feb	ruary 2020
propriation/Budget Activity 40 / 4	R-1 Program Element (PE 0603804A / Logistics Equipment - Adv Dev	Number/Name) and Engineer	Project (Number/Na EW8 / Armored Engir	me) neer Vehicles
	Schedule Details			
		Start	E	Ind
Events	Quar	ter Year	Quarter	Year
Joint Assault Bridge Development & Testing	1	2016	1	2019
Joint Assault Bridge Live Fire Remediation Testing	1	2019	2	2019
Joint Assault Bridge Production Qualification Test	2	2018	1	2019
Joint Assault Bridge Logistics Demonstration	4	2018	1	2019
Joint Assault Bridge Initial Operational Test & Eval	2	2019	3	2019
Joint Assault Bridge Confidence Berm Test	1	2020	1	2020
Joint Assault Bridge Initial Operational Test & Eval Retest	3	2020	4	2020
Joint Assault Bridge Conditional Material Release	4	2020	4	2020
Joint Assault Bridge Full Material Release	1	2022	1	2022
Joint Assault Bridge Low Rate Initial Production	3	2016	2	2021
Joint Assault Bridge Full Rate Production Decision	2	2021	2	2021
Joint Assault Bridge Full Rate Production	2	2021	4	2026
Armored Mobile Earthmover (AME)	1	2018	4	2026
AME Analysis of Alternatives (AOA)	2	2019	4	2019
Assault Breacher Vehicle (ABV) Remote Control System (RCS)	1	2021	2	2026
Request for Prototype Proposals	1	2021	1	2021
Prototype Design	1	2021	3	2021
Prototype Awards	3	2021	3	2021
Prototype Fabrication	3	2021	1	2022
Prototype Competitive Testing	1	2022	4	2022
Production Source Selection	1	2023	1	2023
Contract Award	2	2023	2	2023

Date: February 2020

Exh	nibit R-4A, RDT&E Schedule Details: PB 2021 Army					Date: Febr	uary 2020	
Apr 204	oropriation/Budget Activity 0 / 4	R-1 Program PE 0603804A <i>Equipment - A</i>	Element (Numbe I Logistics and En dv Dev	r/Name) ngineer	Project EW8 / A	(Number/Nan rmored Engin	ne) eer Vehicles	
			St	art		E	nd	
	Events		Quarter	Year		Quarter	Year	
	Developmental Test / Operational Test		3	2023		4	2024	

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060380 <i>Equipment</i>	am Elemen 94A / Logisti - Adv Dev	t (Number/l cs and Eng	Name) ineer	Project (N G11 / Adv	umber/Nan Elec Energy	n e) y Con Ad	
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
G11: Adv Elec Energy Con Ad	-	6.224	3.338	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.562
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project supports the Army Network Modernization Strategy Line of Effort #4, Command Post (CP). The technologies in this portfolio are specifically designed to target CP challenges to enable power resilience across the operational spectrum and to resolve issues with setup and tear-down times and with the CP mobility and footprint. Additionally, this project supports enablers of the Integrated Visual Augmentation System (IVAS) which is a priority technology for the Network and Soldier Lethality CFT's.

As the DoD's Lead Standardization Activity for Tactical Electric Power (TEP), Project Manager Expeditionary Energy & Sustainment Systems (PM E2S2) matures and integrates technology that will improve the next generation of standard tactical power sources in support of all Services. It supports technical maturation of TEP systems that will extend Army operational mission reach and duration in support of the Army Operating Concept and Multi-Domain Battle.

Funding supports modernization of the current Tactical Electric Power capability with technology insertions including, but not limited to hybrid capabilities, light-weight power solutions, vehicle/tactical microgrid interoperability and Tactical Microgrid Standards (TMS). Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment an operational energy concepts.

			FY 2021	FY 2021	FY 2021
	FY 2019	FY 2020	Base	000	Total
Title: Contract Activity	-	0.582	-	-	-
Description: Continue maturation and integration of technology supporting the STEP, CPI2 and PDISE programs.					
<i>FY 2020 Plans:</i> Build infrastructure prototypes to enable optimized use of existing microgrid technologies. Build prototypes to integrate command post vehicle power with Tactical Electric Power systems. Build prototypes to validate feasibility of integrating energy storage with existing TEP systems to address areas of efficiency, reliability, and footprint. Perform front end analysis to assess viability of forward-deployed, mobile nuclear power plants.					
FY 2020 to FY 2021 Increase/Decrease Statement: In FY 2021 there is no RDT&E funding planned for project G11 with a subsequent transition to production.					
<i>Title:</i> Government System Test and Evaluation	0.200	1.010	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020										
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/ PE 0603804A <i>I Logistics and Eng</i> <i>Equipment - Adv Dev</i>	Name) iineer	Project (Number/Name) G11 / Adv Elec Energy Con Ad							
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total					
Description: Supports in house and external performance tests of concept har evaluation of systems at Network Integration Evaluation (NIE) and evaluation of as Army Expeditionary Warrior Experiment (AEWE) and Joint Warfighting Asset										
FY 2020 Plans: Test and evaluate government developed hybrid architectures that will inform the performance of developed prototypes to identify and reduce risks of select tech program.										
FY 2020 to FY 2021 Increase/Decrease Statement: In FY 2021 there is no RDT&E funding planned for project G11 with a subsequ										
Title: Other Contracts and Government agencies		4.389	1.372	-	-	-				
Description: Matrix engineering and analysis support for continued developme STEP program, PDISE, and CPI2, as well as analysis and data management.	ent of technology supporting the									
FY 2020 Plans: Support partnering efforts of power stakeholders including other services and of Provide support to Army demonstrations and exercises to evaluate power techn to gather Soldier feedback. System technologies will include hybrid and storag power systems and determining definition of interfaces and test methodologies										
FY 2020 to FY 2021 Increase/Decrease Statement: In FY 2021 there is no RDT&E funding planned for project G11 with a subsequ	ent transition to production.									
Title: Government Program Management	1.635	0.222	-	-	-					
Description: Continue development of technology supporting the STEP progra										
FY 2020 Plans: Continue oversight and management of various technology projects related to distribution/management across the DoD power spectrum. Specific efforts will it defense systems, and other Army power consumers. Additional efforts include capability gaps and associated solutions across DoD and to OSD energy office. FY 2020 to FY 2021 Increase/Decrease Statement:	Tactical Electric Power and power include support of CPI2, missile communicating power-related es.									

Exhibit R-2A, RDT&E Project Just	ification: PB			Date: Feb	ruary 2020							
Appropriation/Budget Activity 2040 / 4	R-1 P PE 06 <i>Equip</i>	rogram Eler 03804A / Lo ment - Adv [nent (Numbe gistics and En Dev	r/Name) ngineer	Project (Number/Name) G11 / Adv Elec Energy Con Ad							
B. Accomplishments/Planned Pro	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total							
In FY 2021 there is no RDT&E fund	ing planned fo											
Title: FY 2020 SBIR/STTR Transfer	r						-	0.152	-	-	-	
Description: Funding transferred in	accordance v											
FY 2020 Plans: Funding transferred in accordance v												
FY 2020 to FY 2021 Increase/Deci Funding transferred in accordance	r ease Statem with Title 15 U											
	s 6.224	3.338	-	-	-							
C. Other Program Funding Summary (\$ in Millions)												
			FY 2021	<u>FY 2021</u>	<u>FY 2021</u>					<u>Cost To</u>		
Line Item	FY 2019	FY 2020	Base	000	<u>Total</u>	FY 2022	FY 2023	FY 2024	<u>FY 2025</u>	Complete	Total Cost	
• 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	
 MA9800: Generators And Associated Equip 	136.906	115.912	53.433	0.106	53.539	61.474	61.630	65.220	54.980	0.000	549.661	
<u>Remarks</u>												

D. Acquisition Strategy

Complete advanced development pre-Milestone B technology assessments and analysis, and transition products to Engineering and Manufacturing Development (EMD) phase (Milestone B) and subsequent transition to production (Milestone C). Support concept development and demonstration efforts. Products and technologies supported include tactical power and energy sources, alternative/renewable energy systems, power distribution components, and power management and distribution control systems. Perform analysis of Operational Energy related impacts to future development programs to better direct United States Army Combat Capabilities Development Command (CCDC) efforts.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	/ 2020	
Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name) PE 0603804A / Logistics and EngineerProject (Number/Name) G11 / Adv Elec Energy Con Ad G11 / Adv Elec Energy Con Ad							n Ad	
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
Platoon Power Generation	MIPR	PM E2S2 : Ft. Belvoir, VA	0.100	-		-		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	MIPR	PM E2S2 : Fort Belvoir, VA	0.815	0.175		0.040		-		-		-	Continuing	Continuing	Continuing
Hybrid Power Sources Components	MIPR	PM E2S2 : Ft. Belvoir, VA	0.692	0.250		0.077		-		-		-	Continuing	Continuing	Continuing
Power Management and Distribution Systems	MIPR	PM E2S2 : Ft. Belvoir, VA	1.633	0.250		0.101		-		-		-	Continuing	Continuing	Continuing
Operational Energy	MIPR	PM E2S2 : Fort Belvoir, VA	1.660	0.150		-		-		-		-	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.152		-		-		-	0.000	0.152	-
		Subtotal	4.900	0.825		0.370		-		-		-	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
Platoon Power Generation	MIPR	CERDEC : Fort Belvoir, VA	0.750	-		-		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	Various	CERDEC : Fort Belvoir, VA	4.031	0.300		0.090		-		-		-	Continuing	Continuing	Continuing
Hybrid Power Sources Components	Various	Multiple Vendors : TBD	2.675	0.200		0.170		-		-		-	Continuing	Continuing	Continuing
Power Management and Distribution Systems	Various	CERDEC : Fort Belvoir, VA	5.347	0.589		0.320		-		-		-	Continuing	Continuing	Continuing
Operational Energy	TBD	TBD : TBD (FY15)	2.909	0.249		-		-		-		-	Continuing	Continuing	Continuing
Metering and Monitoring Demo	Various	TBD : TBD	0.455	-		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	16.167	1.338		0.580		-		-		-	Continuing	Continuing	N/A
Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	2020	
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Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 0603 Equipm	gram El 3804A / L ent - Adv	ement (N .ogistics a . Dev	lumber/N and Engin	ame) eer	Project G11 / A	(Numbei dv Elec E	r/ Name) Inergy Co	n Ad	
Support (\$ in Million	s)		ſ	FY 2	:019	FY 2	:020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
Small Tactical Electric Power (STEP) Components	MIPR	CERDEC : Fort Belvoir, VA	1.874	0.385		0.236		-		-		-	Continuing	Continuing	Continuing
Hybrid Power Sources Components	MIPR	CERDEC : Fort Belvoir, VA	1.819	-		0.436		-		-		-	Continuing	Continuing	Continuing
Power Management and Distribution Control Systems	MIPR	CERDEC : Fort Belvoir, VA	1.860	0.376		0.696		-		-		-	Continuing	Continuing	Continuing
Platoon Power Generation	MIPR	CERDEC : Fort Belvoir, VA	0.101	-		-		-		-		-	Continuing	Continuing	Continuing
Modular Power	MIPR	Idaho National Labs; Air Force Civil Engineer Center : xxxx	-	3.000		-		-		-		-	Continuing	Continuing	Continuing
Operational Energy	MIPR	Dept of Energy Sandia National Labs : Washington DC	1.757	0.100		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	7.411	3.861		1.368		-		-		-	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ons)		FY 2	:019	FY 2	:020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
Platoon Power Generation (PPG)	MIPR	CERDEC : Fort Belvoir, VA	0.250	-		-		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	MIPR	CERDEC : Fort Belvoir, VA	1.330	0.200		0.439		-		-		-	Continuing	Continuing	Continuing
Hybrid Power Sources Components	MIPR	CERDEC : Fort Belvoir, VA	0.829	-		0.581		-		-		-	Continuing	Continuing	Continuing
Power Management and Distribution Systems	MIPR	CERDEC : Fort Belvoir, VA	2.011	-		-		-		-		-	Continuing	Continuing	Continuing

Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 4 PE 0603804A / Logistics and Engineer G11 / Adv Elec Energy Con Ad Equipment - Adv Dev EX 2021 EX 2021	Exhibit R-3, RDT&E Project Co	ibit R-3, RDT&E Project Cost Analysis: PB 2021 Army													
	Appropriation/Budget Activity 2040 / 4	ppropriation/Budget Activity 040 / 4								ame) eer	Project G11 / A	(Numbe dv Elec E	r/Name) Energy Co	n Ad	
Test and Evaluation (\$ in Millions)FY 2019FY 2020BaseOCOTotal	Test and Evaluation (\$ in Milli		FY 2	2019	FY 2	020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total]			
Contract Method Contract Performing Prior Award Award Award Award Award Cost Total Total Value or Contract Cost Category Item & Type Activity & Location Years Cost Date Cost Cost	Contract Method Cost Category Item & Type	Contract Method Performing Prior & Type Activity & Location Years		Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal 4.420 0.200 1.020 - - Continuing Continuing N/		Subtotal 4.420 0.200				1.020		-		-		-	Continuing	Continuing	N/A
Prior FY 2021 FY 2021 FY 2021 FY 2021 Cost To Target Years FY 2019 FY 2020 Base OCO Total Complete Cost Contract			Prior Years	FY 2	2019	FY 2	020	FY 2 Ba	2021 Ise	FY : Of	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals 32.898 6.224 3.338 - - - Continuing Continuing N/	Project Cost Totals 32.898 6.224					3.338		-		-		-	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy							Date:	February	2020		
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 <i>Equip</i>	rogram Elemen 603804A <i>I Logist</i> ment - Adv Dev	nt (Number/Name tics and Engineer)	Project (N G11 / Adv	l umber / Elec Er	Name) hergy Cor	n Ad		
Event Name	FY 2019	FY 20	020	FY 2021	FY 2022	F	FY 2023	FY	2024	F	Y 2025	;
SMALL TACTICAL ELECTRIC POWER (STEP) PROGRAM	1 2 3 4	1 2 3	3 4	1 2 3 4	1 2 3 4	1	2 3 4	1 2	3 4	1	2 3	4
Assess Technologies, such as STEP, to Meet Gaps-STEP												
Develop prototypes for modular, scalable STEP systems												
AMMPS Hybrid Power Integration												
AMMPS Hybrid Technology Assessment												
AMMPS Hybrid Prototype Development												
PDISE Expansion												
TMS interface & test methodology development												
ASSESSMENT OF TECHNOLOGIES Across TEP line												
Assess Technologies (remote start adapter) to Meet Gaps and												
OPERATIONAL ENERGY (OE)												
Evaluation of OE-Related Impacts, Systems and Improvemer												

chibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Feb	ruary 2020
propriation/Budget Activity R- 40 / 4 PE Eq	1 Program Element (Number E 0603804A / Logistics and Eng puipment - Adv Dev	(Name) gineer	Project (Number/Nar G11 / Adv Elec Energ	ne) y Con Ad
Sched	lule Details			
	Sta	rt	E	nd
Events	Quarter	Year	Quarter	Year
SMALL TACTICAL ELECTRIC POWER (STEP) PROGRAM	1	2016	4	2020
Assess Technologies, such as STEP, to Meet Gaps-STEP	1	2016	2	2020
Develop prototypes for modular, scalable STEP systems	2	2020	4	2020
AMMPS Hybrid Power Integration	1	2020	2	2020
AMMPS Hybrid Technology Assessment	1	2020	2	2020
AMMPS Hybrid Prototype Development	3	2019	4	2020
PDISE Expansion	1	2017	2	2021
TMS interface & test methodology development	1	2019	2	2021
ASSESSMENT OF TECHNOLOGIES Across TEP line	1	2017	4	2020
Assess Technologies (remote start adapter) to Meet Gaps and Improve Efficie	encies 1	2017	4	2020

1

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Evaluation of OE-Related Impacts, Systems and Improvements

OPERATIONAL ENERGY (OE)

2016

2016

2019

2019

4

4

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	ruary 2020	
Appropriation/Budget Activity 2040 / 4	ppropriation/Budget Activity 040 / 4 Prior FY 20						t (Number/ ics and Eng	Name) ineer	Project (N K39 / Field	umber/Nar Sustainme	ne) Int Support A	d
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
K39: Field Sustainment Support Ad	-	2.234	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.234
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project K39 completes in FY19

A. Mission Description and Budget Item Justification

This Project supports development of critical cargo aerial delivery capabilities. These systems will fill identified theater distribution and services capability gaps, improve unit sustainability, and increase combat effectiveness. This Project supports Advanced Component Development and Prototyping of Critical Distribution Capabilities which provide improved safety and accuracy while increasing survivability of aircraft, personnel, and equipment. This Project develops critical enablers that support the Army in executing future movement and maneuver operations and distributed sustainment support by maintaining readiness through fielding and integrating new equipment. 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.

FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
1.279	-	-	-	-
0.955	-	-	-	-
2.234	-	-	-	-
	FY 2019 1.279 0.955 2.234	FY 2019 FY 2020 1.279 - 0.955 - 0.2234 -	FY 2019 FY 2020 FY 2021 Base 1.279 - - - 0.955 - - - 2.234 - - -	FY 2019 FY 2020 FY 2021 FY 2021 1.279 - - - 0.955 - - - 2.234 - - -

Exhibit R-2A, RDT&E Project Justifi	cation: PB	2021 Army							Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4				R-1 Pr PE 060 <i>Equipr</i>	ogram Elen 03804A / Log ment - Adv D	n ent (Numb gistics and E Dev	er/Name) Engineer	Project (N K39 / Field	lumber/Na d Sustainme	me) ent Support	Ad
C. Other Program Funding Summar	y (\$ in Milli	ons <u>)</u>									
			<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>					<u>Cost To</u>	
Line Item	FY 2019	<u>FY 2020</u>	Base	000	<u>Total</u>	<u>FY 2022</u>	FY 2023	FY 2024	<u>FY 2025</u>	<u>Complete</u>	Total Cost
 MA7806: Precision Airdrop 	5.731	2.040	0.000	2.040	2.040	-	-	-	-	0.000	9.811
• 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

<u>Remarks</u>

D. Acquisition Strategy

Conduct pre-Engineering and Manufacturing Development (EMD) advanced component development to reduce risk prior to entering EMD phase.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 Equipm	ogram Ele 3804A / L nent - Adv	ement (N .ogistics a ' Dev	lumber/N and Engin	ame) beer	Project K39 / F	ield Susta	r/Name) hinment Su	ipport Aa	1
Management Service	es (\$ in M	lillions)		FY 2	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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 Management Support	Various	PMFSS : Natick, MA	7.010	0.202		-		-		-		-	0.000	7.212	-
		Subtotal	7.010	0.202		-		-		-		-	0.000	7.212	N/A
Product Developme	nt (\$ in M	illions)		FY 2	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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 t Date Co		Cost To Complete	Total Cost	Target Value of Contract
Extracted High and Low Speed Container Delivery System (EHLSCDS)	Various	Various : Various	1.861	-		-		-		-		-	0.000	1.861	-
ALVADS-L/H DRAS	Various	Various : Various	0.937	-		-		-		-		-	0.000	0.937	-
JPADS Block 1 upgrade	Various	Various : Various	16.434	-		-		-		-		-	0.000	16.434	-
Rapid Rigging/Derigging	Various	Various : Various	0.495	0.250		-		-		-		-	0.000	0.745	-
Advanced Low Velocity Airdrop System-L/H	Various	Various : Various	1.300	0.293		-		-		-		-	0.000	1.593	-
		Subtotal	21.027	0.543		-		-		-		-	0.000	21.570	N/A
Support (\$ in Million	s)			FY 2	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
JPADS Block 1 upgrade	Various	Various : Various	0.110	-		-		-		-		-	0.000	0.110	-
ALVADS-L/H DRAS	Various	Various : Various	0.300	-		-		-		-		-	0.000	0.300	-
Rapid Riggind/DeRigging	Various	Various : Various	0.200	-		-		-		-		-	0.000	0.200	-
		Subtotal	0.610	-		-		-		-		-	0.000	0.610	N/A
PE 0603804A: <i>Logistic</i> Army	cs and En	gineer Equipment -		UN	ICLAS Page 30	SIFIED of 39		R	-1 Line #	91				307	

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 Equipm	ogram Ele 3804A / L pent - Adv	ement (N .ogistics a . Dev	umber/N and Engin	ame) beer	Project K39 <i>I Fi</i>	(Number eld Susta	r/ Name) inment Su	ipport Ad	1
Test and Evaluation ((\$ in Milli	ons)	ſ	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
ALVADS-L/H DRAS	Various	YPG, AZ : YPG, AZ	0.500	-		-		-		-		-	0.000	0.500	-
Extracted High and Low Speed Container Delivery System (EHLSCDS)	Various	YPG, AZ : YPG, AZ	1.000	-		-		-		-		-	0.000	1.000	-
JPADS Block 1 upgrade	Various	YPG, AZ : YPG, AZ	0.950	-		-		-		-		-	0.000	0.950	-
Rapid Rigging/DeRigging	Various	Various : Various	0.200	0.739		-		-		-		-	0.000	0.939	-
Advanced Low Velocity Airdrop System	Various	Various : Various	-	0.750		-		-		-		-	0.000	0.750	-
	Subtotal 2.650					-		-		-		-	0.000	4.139	N/A
			Prior Years	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals				2.234		0.000		-		-		-	0.000	33.531	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 202 [·]	l Army										Da	ate: F	ebruary	2020		
Appropriation/Budget Activity 2040 / 4	propriation/Budget Activity 40 / 4					t (Nur ics and	nber/N d Engii	l ame) neer	F	Project (39 / Fi	(Num eld Sเ	ber/l Istain	Name) ament St	upport A	Ad	
Event Name	FY 2019	FY 20	20	FY 202	1	F	Y 202	2	F١	(2023	Τ	FY	2024	F	Y 2025	7
Event Name	1 2 3 4	1 2 3	4 1	2 3	4	1	2 3	4	1 2	3	4 1	2	3 4	1 2	2 3 4	Ļ
Conduct RRDAS prototype design and fabrication																
Conduct ALVADS/DRAS feasibility study																
Conduct ALVADS/DRAS prototype flight tests																
Evalaute Integrated RRDAS technology																

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army				D	Date: Febru	ary 2020
ppropriation/Budget Activity 040 / 4	R-1 Program E PE 0603804A <i>I</i> <i>Equipment - Ac</i>	Element (Number Logistics and En Iv Dev	r/ Name) gineer	Project (Nur K39 / Field S	mber/Nam Sustainmen	e) t Support Ad
	Schedule Details	i				
	[Sta	art		En	d
Events		Quarter	Year	Qu	larter	Year
Conduct RRDAS prototype design and fabrication		3	2019		4	2019
Conduct ALVADS/DRAS feasibility study		3	2017		1	2019
Conduct ALVADS/DRAS baseline evaluations		2	2018		3	2018
Conduct ALVADS/DRAS prototype flight tests		3	2018		4	2019
Evalaute Integrated RRDAS technology		1	2019		2	2019

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4	ppropriation/Budget Activity)40 / 4 Prior EX 20							Name) ineer	Project (N VR8 I Com Ad	umber/Nan Ibat Service	ne) Support Sy	stems -
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
VR8: Combat Service Support Systems - Ad	-	3.115	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.115
Quantity of RDT&E Articles					-	-	-	-	-	-		

<u>Note</u>

Project VR8 completes in FY 2019

A. Mission Description and Budget Item Justification

This Project supports Advanced Component Development and Prototyping 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 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 unit sustainability, improve resource and energy efficiency and increase combat effectiveness. This Project supports Advanced Component Development and Prototyping of critical tactical support systems that support mobile Joint Service command and control, medical, 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.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Resource and Energy Efficiency Enabling Solutions	1.727	-	-	-	-
Description: Reduces the resource, operational energy and logistics footprint of critical soldier support and sustainment systems while maintaining or improving operational effectiveness. The goal is to significantly reduce fuel, water, and power requirements to sustain multi-domain operations in addition to reducing maintenance and spare parts requirements. Systems such as Command Posts, Expeditionary Operating Bases, and Combat Support Hospitals require a significant amount of logistics and sustainment support which cost valuable resources, require extra human effort (that means a risk in the form of Soldiers on the road), limit endurance, restrict agility, and increase vulnerability.					
Title: Army Standard Family of Rigid Wall Shelters (ASF-RWS)	1.388	-	-	-	-
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					

Exhibit R-2A, RDT&E Project Jus	tification: PB	2021 Army							Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4		nent (Numb gistics and E Dev	e r/Name) ingineer	Project (N VR8 / Con Ad	umber/Na nbat Servic	me) e Support S	ystems -				
B. Accomplishments/Planned Pr	ograms (\$ in I	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total					
by PMs as a cost under their program Kanagers by PMs as a cost under their program Expandable; (2) Vehicle Mounted; improvements: reduced cost, reduced improved transportability.	s (PMS) requiri am(s). The AS and (3) Paneliz ced weight, imp										
			Accomplis	hments/Plai	nned Progra	ams Subtota	l s 3.115	5 -	-	-	-
C. Other Program Funding Sumn	nary (\$ in Milli	<u>ons)</u>	EV 2021	EV 2021	EV 2021					Cost To	
Line Item • VR7: Combat Service Support Systems	<u>FY 2023</u> -	<u>FY 2024</u> -	<u>FY 2025</u> -	<u>Complete</u> 0.000	<u>Total Cost</u> 4.837						

<u>Remarks</u>

D. Acquisition Strategy

Evaluate integrated technologies in a realistic operational environment and transition promising efforts into Engineering and Manufacturing Development (EMD). Accelerate efficiency, standardization, and safety initiatives to incorporate in deployed systems, develop new Technical Data Packages (TDP), and/or incorporate during reset of equipment.

Approvame Hermotype Series with the series withe series withe series withe series with the series with the serie	Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	2020	
Management Sorvices (s in Willows) Prior	Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 <i>Equipn</i>	ogram Ele 3804A / L nent - Adv	ement (N .ogistics a [.] Dev	l umber/N and Engir	ame) beer	Project VR8 / C Ad	(Numbe Combat Se	r/Name) ervice Sup	port Sys	tems -
$ \begin{array}{ c c c c } \hline \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	Management Service	es (\$ in M	lillions)		FY	2019	FY	2020	FY : Ba	2021 ase	FY 2	2021 CO	FY 2021 Total			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	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 Management Support	Various	PM FSS : Natick, MA	2.276	0.365	Nov 2018	-		-		-		-	0.000	2.641	-
Product Development User Willier Fride Total Sector S			Subtotal	2.276	0.365		-		-		-		-	0.000	2.641	N/A
Contract Schlengyper Peroming Autivity A Locani Prior Peroming Maines Prior Cost Prior <	Product Developmer	nt (\$ in M	illions)		FY	2019	FY 2021 FY FY 2020 Base O		2021 CO	FY 2021 Total						
Soldier Support EquipmentVariousVariousVarious10.107(-)	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
$\begin{split} \begin{titrescalar}{ c $	Soldier Support Equipment	Various	Various : Various	10.107	-		-		-		-		-	0.000	10.107	-
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Energy Efficiency Enabling Solutions	Various	Various : Various	0.191	0.681	Jan 2019	-		-		-		-	0.000	0.872	-
Subtotal10.2981.7220012.0012.00N/ATest and Evaluation (\$ in Millions)FY 2019FY 2021 FY 2019FY 2021 BaseFY 2021 BaseFY 2021 TotalFY 2021 TotalFY 2021 TotalFY 2021 TotalFY 2021 TotalN/ACost Category ItemPerforming & TotalAward DateCostFY 2021 BaseFY 2021 TotalFY 2021 TotalFY 2021 TotalN/ACost Category ItemPerforming & TotalAward Performing Activity & LocationPrior YearsAward CostCostAward DateCostAward CostAward DateCostCostTotalTotal CostTotalTotal Cost <th< td=""><td>Army Standard Family of Rigid Wall Shelters (ASF- RWS)</td><td>Various</td><td>Various : Various</td><td>-</td><td>1.041</td><td>Dec 2018</td><td>-</td><td></td><td>-</td><td></td><td>-</td><td></td><td>-</td><td>0.000</td><td>1.041</td><td>-</td></th<>	Army Standard Family of Rigid Wall Shelters (ASF- RWS)	Various	Various : Various	-	1.041	Dec 2018	-		-		-		-	0.000	1.041	-
Test and Evaluation (+ multiple in the integral integral in the integral int			Subtotal	10.298	1.722		-		-		-		-	0.000	12.020	N/A
Contract Method & TypePerforming Activity & LocationPrior YearsCostAward DateCostAward DateAward 	Test and Evaluation	(\$ in Milli	ions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	FY 2021 Total]		
Soldier Support EquipmentVariousVarious : Various5.650 <td>Cost Category Item</td> <td>Contract Method & Type</td> <td>Performing Activity & Location</td> <td>Prior Years</td> <td>Cost</td> <td>Award Date</td> <td>Cost</td> <td>Award Date</td> <td>Cost</td> <td>Award Date</td> <td>Cost</td> <td>Award Date</td> <td>Cost</td> <td>Cost To Complete</td> <td>Total Cost</td> <td>Target Value of Contract</td>	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
Energy Efficiency Enabling SolutionsVariousVariousO.7.15O.4.78Feb 2019 \dots </td <td>Soldier Support Equipment</td> <td>Various</td> <td>Various : Various</td> <td>5.650</td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td>0.000</td> <td>5.650</td> <td>-</td>	Soldier Support Equipment	Various	Various : Various	5.650	-		-		-		-		-	0.000	5.650	-
Army Standard Family of Rigid Wall Shelters (ASF- RWS)VariousVariousImage: Constant of the standard family of RWS)VariousVariousVariousImage: Constant of the standard family of RWS)Nov 2018Image: Constant of the standard family of RWS)Image: Constant of the standard family of RWS)Various </td <td>Energy Efficiency Enabling Solutions</td> <td>Various</td> <td>Various : Various</td> <td>0.715</td> <td>0.478</td> <td>Feb 2019</td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td>0.000</td> <td>1.193</td> <td>-</td>	Energy Efficiency Enabling Solutions	Various	Various : Various	0.715	0.478	Feb 2019	-		-		-		-	0.000	1.193	-
Subtotal 6.365 1.028 - - - - 0.000 7.393 N/A Prior Years Prior Years FY 2019 FY 2020 FY 2021 Base FY 2021 OCO FY 2021 Total FY 2021 Cost To Complete Total Cost Total Cost Total Cost Total Cost Total Cost Total Cost Total Cost N/A Project Cost Totals 18.939 3.115 0.000 - - - 0.000 22.054 N/A	Army Standard Family of Rigid Wall Shelters (ASF- RWS)	Various	Various : Various	-	0.550	Nov 2018	-		-		-		-	0.000	0.550	-
Prior Years FY 2019 FY 2020 FY 2021 Base FY 2021 OCO FY 2021 Total Cost To Complete Total Total Total Total Total Cost To Contract Project Cost Totals 18.939 3.115 0.000 - - - 0.000 22.054 N/A			Subtotal	6.365	1.028		-		-		-		-	0.000	7.393	N/A
Project Cost Totals 18.939 3.115 0.000 - - 0.000 22.054 N/A	Prior Years		FY	2019	FY	2020	FY 2 Ba	2021 ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
		Project Cost Totals 18.93			3.115		0.000		-		-		-	0.000	22.054	N/A

PE 0603804A: Logistics and Engineer Equipment - Adv D... Army

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2	ibit R-3, RDT&E Project Cost Analysis: PB 2021 Army											
Appropriation/Budget Activity 2040 / 4	R-1 Program Ele PE 0603804A / L Equipment - Adv	ement (Number/N ₋ ogistics and Engir ' Dev	l ame) neer	Project (Number/Name) VR8 / Combat Service Support System Ad								
	FY 2020	FY 2021 Base	FY 2 OC	021 O	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract				

Remarks

chibit R-4, RDT&E Schedule Profile: PB 2021 Army											Date: February 2020																		
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name)ProjectPE 0603804A / Logistics and EngineerVR8 / CEquipment - Adv DevAd								ct (Number/Name) Combat Service Support Systems -																		
F irmt Name		FY	201	9		FY	202	20		FY	202	21		F١	<u> 20</u>	22		F	-Y 2	2023	5		FY	202	24		FY	202	25
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1		2	3	4	1	2	3	4	1	2	3	4
Conduct evaluation on resource & energy efficiency enabling so																													
Obtain Milestone B and transition ASF-RWS (Exp/Non-Exp) to Ef																													
Award OTA Element 1 for ASF-RWS																													
Conduct ASF-RWS Design Development																													
													1									1				1			

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army	, RDT&E Schedule Details: PB 2021 Army							
ppropriation/Budget ActivityR040 / 4PIEd	-1 Program Element (Number E 0603804A / Logistics and En quipment - Adv Dev	Program Element (Number/Name)Project603804A / Logistics and EngineerVR8 / Cooment - Adv DevAd						
Scheo	dule Details							
	Sta	art		End	b			
Events	Quarter	Year	Qu	arter	Year			
Conduct evaluation on resource & energy efficiency enabling solutions	1	2016		4	2019			
Obtain Milestone B and transition ASF-RWS (Exp/Non-Exp) to EMD	1 2019			3	2019			
Award OTA Element 1 for ASE-RWS	1	2019		1	2019			

2

Conduct ASF-RWS Design Development

2019

2019

4

Exhibit R-2, RDT&E Budget Item		Date: February 2020										
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	ppropriation/Budget Activity)40: Research, Development, Test & Evaluation, Army I BA 4: Advanced omponent Development & Prototypes (ACD&P)						t (Number/ al 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
Total Program Element	-	38.371	36.975	28.520	-	28.520	37.008	27.659	27.674	28.273	0.000	224.480
808: DoD Drug & Vacc Ad	-	11.511	11.315	10.894	-	10.894	9.995	9.344	9.494	9.709	0.000	72.262
811: Mil HIV Vac&Drug Dev	-	3.595	5.460	5.098	-	5.098	6.267	1.309	1.145	1.145	0.000	24.019
836: Field Medical Systems Advanced Development	-	15.676	14.107	12.226	-	12.226	20.435	17.006	17.035	17.419	0.000	113.904
CS4: MEDICAL SYSTEMS ADV DEV INITIATIVES (CA)	-	5.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.000
FF4: Counterdrug, DDR, Sys Development & Demonstration	-	2.296	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.296
VS7: MEDEVAC Mission Equipment Package (MEP) - Adv Dev	-	0.293	6.093	0.302	-	0.302	0.311	0.000	0.000	0.000	0.000	6.999

A. Mission Description and Budget Item Justification

This Program Element (PE) funds development of medical materiel within the early system integration portion of the System Development and Demonstration phase of the acquisition life cycle using 6.4 (Advanced Component Development and Prototype) funding. Program efforts support transition of promising Science and Technology candidate medical technologies (drugs, vaccines, medical devices, diagnostics, and mechanisms for detection and control of disease carrying insects) to larger scale testing in humans for safety and effectiveness. Programs are aligned to meet future force requirements identified within concept documents and organizational structures. This PE also provides funding for Food and Drug Administration (FDA) regulated human clinical trials to gain additional information about safety and effectiveness on the path to licensure for use in humans. These efforts are managed by 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Ar	Date	: February 202	20			
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA Component Development & Prototypes (ACD&P)	4: Advanced	R-1 Program PE 0603807 <i>A</i>	Element (Number/Name) Dev		
B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	<u>FY 2021</u>	Total
Previous President's Budget	39.244	31.175	30.785	-	3	30.785
Current President's Budget	38.371	36.975	28.520	-	2	28.520
Total Adjustments	-0.873	5.800	-2.265	-		-2.265
 Congressional General Reductions 	-	-				
 Congressional Directed Reductions 	-	-				
 Congressional Rescissions 	-	-				
 Congressional Adds 	-	5.800				
Congressional Directed Transfers	-	-				
Reprogrammings	-0.873	-				
SBIR/STIR Transfer	-	-	0.005			0.005
 Adjustments to Budget Years 	-	-	-2.265	-		-2.265
Congressional Add Details (\$ in Millions, and Inclu Project: CS4: MEDICAL SYSTEMS ADV DEV INITIA Congressional Add: Transport Telemedicine	des General Red TIVES (CA)	<u>ductions)</u>		-	FY 2019 5.000	FY 2020
			Congressional Add Subto	otals for Project: CS4	5.000	-
Project: VS7: MEDEVAC Mission Equipment Package	e (MEP) - Adv De	ev		-		
Congressional Add: Transport Telemedicine					-	5.800
			Congressional Add Subto	otals for Project: VS7	-	5.800
			Congressional Add	Totals for all Projects	5.000	5.800

Exhibit R-2A, RDT&E Project Ju		Date: February 2020										
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060380	am Element)7A / Medica	t (Number / al Systems ·	lumber/Name) Drug & Vacc Ad				
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
808: DoD Drug & Vacc Ad	-	11.511	11.315	10.894	-	10.894	9.995	9.344	9.494	9.709	0.000	72.262
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds development of candidate medical countermeasures for infectious diseases of military relevance. These efforts are in: vaccines, drugs, diagnostic kits/ devices, and studies to determine if insects infected with pathogenic organisms are capable of infecting service members/preventive medicine measures. These funds support human clinical effectiveness (capacity to produce a desired size of an effect under ideal or optimal conditions) trials of the drug/vaccine in larger groups that are designed to assess how well the drug/vaccine works and continue safety assessments in a larger group of volunteers. Funding supports both technical evaluations and human clinical testing to assure the safety and effectiveness of medical diagnostic kits and devices. This work, which is performed in military laboratories or civilian pharmaceutical firms, is directed toward the prevention of disease, early diagnosis, and accelerated recovery time once diagnosed to enhance battlefield readiness. All clinical trials are conducted in accordance with United States (U.S.) Food and Drug Administration (FDA) regulations, a mandatory obligation for all military products placed into the hands of medical providers or service members. Product development priorities are determined based upon four major factors: (1) the extent and threat 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 and production). Products from this Project will transition to PE 0604807A/Project 849.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: DoD Drug and Vaccine Advanced Development	11.511	10.860	10.894
Description: Funding is provided for the development of candidate medical countermeasures for military relevant infectious disease focusing on prevention, early diagnosis and accelerated recovery time. Funding supports both technical evaluations and human clinical testing to assure the safety and effectiveness of medical diagnostic kits and devices.			
FY 2020 Plans: Dengue Vaccine Block II - Will continue the clinical development of the dengue human infection model (DHIM), a tool for rapid evaluation of efficacy of dengue vaccines and therapeutics.			
Treatment for Resistant Wound Infections: Will monitor technical maturity of candidate treatments for evidence of safety and efficacy in relevant animal models.			
Malaria Chemoprophylaxis ?Tafenoquine (formerly Next Generation Malaria Prophylaxis): Will continue the retinal (eye) safety study (3 year study) started in FY 2017. Address any FDA post-marketing approval requirements.			
	'	I I	

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: F	ebruary 2020)	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv Dev	Project (Number/ 808 / DoD Drug &	Name) Vacc Ad	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Rapid Diagnostic and Detection Devices (Infectious Disease Diagnostics (N 0604807A Project 849 in FY 2019. The chikungunya assays will continue to conducted for chikungunya.	/lultiple)) - The dengue assay transitioned to PE o be developed and evaluated. Clinical testing wil	l be		
FY 2021 Plans: Treatment for Resistant Infections ? Antifungal Drug (formerly Treatment for of candidate treatments for evidence of safety and efficacy in relevant anim	r Resistant Infections): Will monitor technical mati al models.	urity		
Malaria Prophylactic Drug ? Tafenoquine (TQ) (Formerly Next Generation N 2019. Will continue the retinal (eye) safety study. Additional clinical sites w requirements.	Malaria Prophylaxis): Achieved Milestone C in FY ere added. Address any FDA post-marketing app	roval		
Rapid Diagnostic and Detection Devices (Infectious Disease Diagnostics (N 0604807A Project 849 in FY 2019 as expected. The dengue assay will tran continue to be developed and evaluated. Clinical testing will be conducted to	/lultiple)): The dengue assay did not transition to F nsition in FY 2020. The chikungunya assays will for chikungunya.	Έ		
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decrease in FY 2021 to progression of product development efforts	S.			
Title: FY 2020 SBIR/STTR Transfer		-	0.455	-
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 Sub	totals 11.511	11.315	10.894
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A				
<u>Remarks</u>				
D. Acquisition Strategy Test and evaluate in-house and commercially developed products in exten licensure and Environmental Protection Agency registration ensuring gover	sive commercial partner or government-managed rnment (military) requirements are met with judicic	clinical trials to gatl ous investment.	ner data requi	red for FDA

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	/ 2020	
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Pro PE 060	ogram El 3807A / /	ement (N Medical S	l umber/N Systems - J	ame) Adv Dev	Project 808 / <i>D</i> e	(Numbe oD Drug &	r/ Name) & Vacc Ac	d	
Management Service	es (\$ in M	illions)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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 Management Services Cost	Various	Not Applicable : Not applicable	24.045	4.785		0.659		0.300		-		0.300	Continuing) Continuing	, Continuing
Medical Product Development Management Services Cost	PO	General Dynamics Information Technology, : Frederick MD	6.988	0.730		0.709		0.700		_		0.700	0.000	9.127	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.455		-		-		-	0.000	0.455	-
		Subtotal	31.033	5.515		1.823		1.000		-		1.000	Continuing	Continuing	, N/A
Product Development (\$ in Millions)			FY 2019		FY 2020		FY 2021 Base		FY 2	2021 CO	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 Cost	Various	Not applicable : Not applicable	33.219	0.467		5.308		-		-		-	Continuing	Continuing	Continuing
Rapid Diagnostic and Detection Devices	C/Various	Inbios, Inc : Seattle WA	-	1.997		2.363		2.786		-		2.786	0.000	7.146	-
Treatment for Resistant Infections - Antifungal Drug	Various	TBD : TBD	-	-		-		1.993		-		1.993	0.000	1.993	-
Next Generation Malaria Drug (D5P)	Various	TBD : TBD	-	-		-		2.716		-		2.716	0.000	2.716	-
Staphylococcus aureus Vaccine	Various	TBD : TBD	-	-		-		1.818		-		1.818	0.000	1.818	-
		Subtotal	33.219	2.464		7.671		9.313		-		9.313	Continuing	Continuing	i N/A
Support (\$ in Millions	Support (\$ in Millions)			FY 2	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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	Not Applicable : Not applicable	15.721	0.425		0.042		-		-		-	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Program Element (Number/Name)ProjectionPE 0603807A / Medical Systems - Adv Dev808 /						oject (Number/Name) 8 I DoD Drug & Vacc Ad			
Support (\$ in Million	is)			FY 2	019	FY 2	020	FY 2 Ba	2021 Ise	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	15.721	0.425		0.042		-		-		-	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ons)	ſ	FY 2	019	FY 2	020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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	Not applicable : Not applicable	56.719	0.379		-		-		-		-	Continuing	Continuing	Continuing
Dengue Block II	IA	WRAIR and AFRIMS : Silver Spring MD	1.720	0.780		0.812		-		-		-	0.000	3.312	-
Malaria Prophylaxis Clinical Trial	TBD	TBD : TBD	9.175	1.948		0.967		0.581		-		0.581	0.000	12.671	-
		Subtotal	67.614	3.107		1.779		0.581		-		0.581	Continuing	Continuing	N/A
			Prior Years	FY 2	019	FY 2	020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
	Project Cost Totals 147.587 11.511					11.315 10.894 -					10.894	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy					Date: February	2020
Appropriation/Budget Activity 2040 / 4		R-1 F PE 0	Program Elemen 603807A / Medic	n t (Number/Name) al Systems - Adv De	Project (N ev 808 / DoD	lumber/Name) Drug & Vacc Ad	
EventName	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Eventivanie	1 2 3 4	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 Vaccine Block II Human Infection model studies							FY24-FY28
Treatment for Resistant Wound Infections Antifungal Drug Phase	FY16-FY23						
D5P Next Generation Malaria Drug Phase 2 Safety trial							
			FY2	1-FY25			
Rapid Human Diagnostic Devices	EV17-EV25						

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020							
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Num PE 0603807A / Medical Syste	o er/Name) ms - Adv Dev	Project (Number/Nan 808 / DoD Drug & Vac	ne) cc Ad					
	Schedule Details								
		Start	E	nd					
Events	Quarter	Start Year	E Quarter	nd Year					
Events Dengue Vaccine Block II Human Infection model studies	Quarter 1	Start Year 2025	E Quarter 4	nd Year 2028					
Events Dengue Vaccine Block II Human Infection model studies Treatment for Resistant Wound Infections Antifungal Drug	Quarter 1 Ig Phase 2 safety trial	Year 2025 2017	E Quarter 4 4	nd Year 2028 2023					
Events Dengue Vaccine Block II Human Infection model studies Treatment for Resistant Wound Infections Antifungal Drug D5P Next Generation Malaria Drug Phase 2 Safety trial	Quarter 1 Ig Phase 2 safety trial 4	Year 2025 2017 2021	E Quarter 4 4 4 4	nd Year 2028 2023 2025					

Exhibit R-2A, RDT&E Project J	ustification	: PB 2021 A	vrmy							Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4	oropriation/Budget Activity 0 / 4 Prior				R-1 Progr PE 060380	am Elemen D7A / Medica	t (Number / al Systems	Name) - Adv Dev	Project (N 811 / Mil H	umber/Na //V Vac&Dr	me) rug 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
811: Mil HIV Vac&Drug Dev	-	3.595	5.460	5.098	-	5.098	6.267	1.309	1.145	1.145	5 0.000	24.019
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
clinical trials in a group of health in, and excreted from the body, deployment. The cumulative cos conducted in accordance with U Research efforts are coordinate Deficiency Syndrome (DAIDS).	y volunteers and to inves at of treating .S. FDA reg d with the Na	to assess f tigate the ap HIV-positive ulations. Pro ational Instit	or safety ar opropriate d e DoD perso oducts from utes of Hea	nd tolerabilit ose. Develo onnel is est this Projec Ith and the	ty of medica opment effo imated to bo t will transiti National Ins	al counterme orts are focu: e \$16.6 billio ion to PE 06 stitute of Alle	easures, ho sed on milit on for 3000 604807A/Pro ergy and Inf	w the drug/ arily unique personnel (pject 812. ectious Dis	vaccine is d e needs affe over a 50-ye eases (NIAI	istributed ti cting mann ear lifetime. D), Divisio	hrough, mel iing, mobiliz . All clinical n of Acquire	tabolized ation, and trials are ed Immune
B. Accomplishments/Planned	Programs (in Millions	<u>s)</u>						FY	2019	FY 2020	FY 2021
Title: Military HIV Vaccine & Dru	g Developm	ent								3.595	5.212	5.098
Description: This Project funds effectiveness in evaluations with FY 2020 Plans: Regional Vaccine Candidate: Eff development.	advanced d human subj ort will not b	evelopment ects, and pr e funded in	research to otect militai this BA unti	o develop ca ry personne il FY 2023 v	andidate HI el from risks when the ef	V vaccines, associated fort transitio	assess thei with HIV in ns to advan	r safety and fection. ced	d			
Global Vaccine Candidate: Will d	ontinue to s	upport clinic	al trial sites	based on	a Cooperati	ve Researc	h and Deve	lopment				

Agreement (CRADA) with a commercial partner.

FY 2021 Plans:

Global Vaccine Candidate: Will continue to support clinical trial sites based on a Cooperative Research and Development Agreement (CRADA) with a commercial partner.

FY 2020 to FY 2021 Increase/Decrease Statement:

The decrease of funding in FY 2021 was due to the projected requirements of the program.

Title: FY 2020 SBIR/STTR Transfer

Description: Funding transferred in accordance with Title 15 USC ?638

0.248

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: F	ebruary 2020)			
Appropriation/Budget Activity 2040 / 4	Project (Number/Name) 811 / Mil HIV Vac&Drug Dev					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021		
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 Subte	otals 3.595	5.460	5.098		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy						
Test and evaluate commercially developed drug/vaccine candidates in go	vernment-managed trials.					

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Army									Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 0603	gram Ele 3807A / /	ement (N Medical S	lumber/N Systems - /	ame) Adv Dev	Project 811 / <i>M</i>	(Numbe il HIV Vac	r/ Name) :&Drug De	ev	
Management Service	es (\$ in M	illions)		FY 2	2019	FY 2	020	FY : Ba	2021 ase	FY 2 OC	2021 CO	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 Management Services Cost	TBD	Not Applicable : Not Applicable	4.132	-		-		-		-		-	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.248		-		-		-	0.000	0.248	-
		Subtotal	4.132	-		0.248		-		-		-	Continuing	Continuing	N/A
Not Applicable Product Developmer	nt (\$ in M	illions)		FY 2	2019	FY 2	020	FY : Ba	2021 ase	FY 2 O(2021 CO	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 Cost	TBD	Not applicable : Not applicable	5.078	-		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	5.078	-		-		-		-		-	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY 2	2019	FY 2	020	FY : Ba	2021 ase	FY 2 O(2021 CO	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	TBD	TBD : TBD	3.551	0.990		-		-		-		-	0.000	4.541	-
		Subtotal	3.551	0.990		-		-		-		-	0.000	4.541	N/A
Remarks															

Not Applicable

et Activity	,										Duto.	rebruury	2020		
oropriation/Budget Activity 0 / 4						gram Ele 3807A / /	ement (Ni /ledical Sy	umber/Na /stems - /	ame) Adv Dev	Project 811 / <i>M</i>	(Number il HIV Vac	/ Name) &Drug De	V		
(\$ in Milli	ons)	ſ	FY 2	019	FY 2	020	FY 2 Bas	021 se	FY 2021 OCO		FY 2021 Total				
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	
TBD	Not applicable : Not Applicable	25.599	2.605		5.212		3.848		-		3.848	0.000	37.264	-	
C/CPFF	PPD : Wilmington, NC	-	-		-		1.250		-		1.250	0.000	1.250	-	
	Subtotal	25.599	2.605		5.212		5.098		-		5.098	0.000	38.514	N/A	
		Prior Years	FY 2	019	FY 2	020	FY 2 Bas	021 se	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
		Years	FY 2	019	FY 2	020	Ba	se	00	0	Total	Complete	Cost	Contract	
_	Project Cost Totals	38.360	3.595		5.460		5.098		-		5.098	Continuing	Continuing	N/P	
	(\$ in Milli Contract Method & Type TBD C/CPFF	(\$ in Millions) Contract Method & Type Performing Activity & Location TBD Not applicable : Not Applicable C/CPFF PPD : Wilmington, NC Subtotal	Contract Method Performing Prior Years TBD Not applicable : Not Applicable 25.599 C/CPFF PPD : Wilmington, NC - Subtotal 25.599 Project Cost Totals 38.360	Contract Method Performing Activity & Location Prior Years Cost TBD Not applicable : Not Applicable 25.599 2.605 C/CPFF PPD : Wilmington, NC - - Subtotal 25.599 2.605 Prior PPD : Wilmington, NC - - Project Cost Totals 38.360 3.595	FY 2019 Contract Method & Type Performing Activity & Location Prior Years Cost Award Date TBD Not applicable : Not Applicable 25.599 2.605 - C/CPFF PPD : Wilmington, NC - - - Subtotal 25.599 2.605 - - Subtotal 25.599 2.605 - - Prior PPD : Wilmington, NC - - - Subtotal 25.599 2.605 - - Prior Prior Subtotal 25.599 2.605 - Prior Subtotal 25.599 2.605 - - Prior Subtotal 25.599 2.605 - - Prior Subtotal 38.360 3.595 - -	FY 2019 FY 2 Contract Method & Type Performing Activity & Location Prior Years Cost Award Date Cost TBD Not applicable : Not Applicable 25.599 2.605 5.212 C/CPFF PPD : Wilmington, NC - - - Subtotal 25.599 2.605 5.212 Very Prior Years FY 2019 FY 2 Prior Years FY 2019 FY 2 Project Cost Totals 38.360 3.595 5.460	(\$ in Millions)FY 2019FY 2020Contract Method & TypePerforming Activity & Location Applicable : Not ApplicablePrior YearsAward CostAward DateAward DateTBDNot applicable : Not Applicable25.5992.6055.212-C/CPFFPPD : Wilmington, NCSubtotal25.5992.6055.212-Fy 2019FY 2020Prior YearsFry 2019FY 2020	(\$ in Millions)FY 2019FY 2020FY 2030Contract Method & TypePerforming Activity & Location ApplicablePrior YearsAward CostAward DateAward CostAward DateAward CostTBDNot applicable25.5992.6055.2123.848C/CPFFPPD : Wilmington, NC1.250Subtotal25.5992.6055.2125.098Prior YearsFY 2019FY 2020FY 2FY 2019FY 2020BaProject Cost Totals38.3603.5955.4605.098	(\$ in Millions)FY 2019FY 2020FY 2021 BaseContract Method & TypePerforming Activity & Location ApplicablePrior Years 25.599Award CostAward DateAward CostAward DateAward DateAward DateAward DateTBDNot applicable : Not Applicable25.5992.6055.2123.848C/CPFFPPD : Wilmington, NC1.250Subtotal25.5992.6055.2125.098Prior YearsFY 2019FY 2020FY 2021 BaseProject Cost Totals38.3603.5955.4605.098	(\$ in Millions)FY 2019FY 2020FY 2021FY 2021FY 2021Contract Method & Type Activity & Location Applicable : Not Applicable : Not applicable : Not Applicable NCPrior 25.599Award CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward 	(\$ in Millions)FY 2019FY 2020FY 2021 BaseFY 2021 OCOContract Method & Performing & Activity & Location Applicable : Not ApplicablePrior 25.599Award CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward Cost <td>(\$ in Millions)FY 2019FY 2020FY 2021FY 2021<th colsp<="" td=""><td></td><td></td></th></td>	(\$ in Millions)FY 2019FY 2020FY 2021FY 2021 <th colsp<="" td=""><td></td><td></td></th>	<td></td> <td></td>		

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	vrmy							Date: February	2020
Appropriation/Budget Activity 2040 / 4		I	R-1 Pr PE 060	ogram Ele 03807A / <i>M</i>	nen edica	t (Number/Nam al Systems - Adv	e) Project (N Dev 811 / Mil F	lumber/Name) HIV Vac&Drug De	v
							Ι	1	
Event Name	FY 2019	FY 202	20	FY 202	1	FY 2022	FY 2023	FY 2024	FY 2025
Global HIV (Ad26/Ad26+gp140) Phase 2B Clinical Trial	1 Z J 4	1 Z J	4	1 2 3	4	<u> 1 </u>	1 2 3 4	1 2 3 4	1 2 3 4
Global HIV (Ad26/Ad26+gp140) Phase 3 Efficacy Clinical Trial			FY20-FY	24					
Global HIV (Block 2) Enters TMMR								FY24-FY24	
Global HIV (Block 2) Phase 2B Clinical Trial								FY24-	FY28
L							I	1	<u> </u>

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army Date: Februa									
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number PE 0603807A / Medical System	r/Name) Pr <i>s - Adv Dev</i> 81	Project (Number/Name) 811 / Mil HIV Vac&Drug Dev						
Sch	edule Details								
	St	art	E	nd					
Events	Quarter	Year	Quarter	Year					
Global HIV (Ad26/Ad26+gp140) Enters TMMR	2	2017	3	2017					
Global HIV (Ad26/Ad26+gp140) Phase 2B Clinical Trial	1	2019	1	2022					
Global HIV (Ad26/Ad26+gp140) Phase 3 Efficacy Clinical Trial	4	2020	1	2025					
Global HIV (Block 2) Enters TMMR	2	2024	4	2024					
Global HIV (Block 2) Phase 2B Clinical Trial	4	2024	4	2028					

Exhibit R-2A, RDT&E Project J	ustification	: PB 2021 A	Army							Date: Feb	ruary 2020			
Appropriation/Budget Activity 2040 / 4	propriation/Budget Activity 40 / 4						t (Number / al Systems	Name) - Adv Dev	Project (N 836 / Field Developme	Project (Number/Name) 836 I Field Medical Systems Advanced 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		
836: Field Medical Systems Advanced Development	-	15.676	14.107	12.226	-	12.226	20.435	17.006	17.035	17.419	0.000	113.904		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				
tunds human clinical trials to tes When available, commercial-off Consideration is also given to re clinical trials are conducted in ac B. Accomplishments/Planned	t the safety s -the-shelf (C educing the r ccordance w Programs (s	and effective OTS) medic nedical logis ith U.S. FDA in Million	eness of bio al products stics footprir A regulation <u>s)</u>	logics (prod are also te at through s s. Products	ducts derive ested and ev smaller weig s from this p	ed from living valuated for t jht, volume, roject will tra	g organisms transition to and equipn ansition to F	s) and devic engineerin nent indepe PE 0604807	es necessa g and manu ndence fror A/Project 8	ary to meet ufacturing o n supportir 32. 2019	medical red levelopmen lg materials FY 2020	t. . All FY 2021		
<i>Title:</i> Field Medical Systems Ad Treatment (formerly PM Medica	vanced Deve Il Devices)	elopment - F	Program Ma	nagement	(PM) Warfig	hter Expedi	tionary Meo	licine and		6.947	2.838	11.017		
Description: Funding is provide care.	d for the dev	velopment o	f the followi	ng medical	devices in s	support of ei	nhanced co	mbat casua	alty					
FY 2020 Plans: Temporary Corneal Repair (TCF contract along with all of the Pha	R): Continue ase II SBIR?s	down-selec s supporting	t activities. I the TCR co	nitiate pre- ontract will b	clinical segr be complete	ment of the ⁻ ed.	Temporary	Corneal Re	pair					
Extracorporeal Life Support ?Lu MS B review, down select to mo	ng/Renal (E0 st promising	CLS ?L/R): (device and	Continue cli conduct FD	nical trials a A pre-subr	and device mission mee	refinement. eting to finali	Conduct MS ze regulato	S B review. ry strategy.	Post					
Non-invasive neuro assessment efforts for NINAD device. Field A	device (NIN Anesthesia: F	IAD): Will co Product deve	mplete FDA elopment eli	clinical tria	al. If trial is sure to CSA p	successful, v riorities.	will initiate r	nanufacturi	ng					
FY 2021 Plans: Temporary Corneal Repair: Will Extracorporeal Life Support - Lu by the Food and Drug Administr Non-invasive neuro assessment	conduct initi ng/Renal: Co ation. device (NIN	al clinical tri ontinue pre- IAD): Movec	als in huma clinical and/ I to WBH du	ns to asses or clinical s ie to PMO I	ss safety. studies for tl Reorganiza	ne lung and tion.	renal comp	onents requ	uired					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	Project (Nu 836 / Field Developme	I mber/N Medical nt	lame) Systems Adv	vanced	
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2019	FY 2020	FY 2021
Extremity Injury Repair ? Vascular: Will continue ongoing clinical trials for mil manufacturing contract.	litary relevant applications. Will continue ongoi	ng			
FY 2020 to FY 2021 Increase/Decrease Statement: Increase in funding FY21 is due to reorganization of PMOs.					
<i>Title:</i> Field Medical Systems Advanced Development - PM Warfighter Protecti Systems)	ion and Acute Care (formerly PM Pharmaceutic	al	-	4.498	-
Description: Funding is provided for development of blood products enhance	d combat casualty care and follow-on care.				
<i>FY 2020 Plans:</i> Cold Stored Platelets in Platelet Additive Solution: Will begin Phase II clinical t (type of injury/surgical procedure) and numbers to assess safety, effectiveness planned progression of medical products under development.	trial based on FDA guidance as to patient popu s and dose of candidate product. FY 2020 is a	lation			
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decrease in FY 2021 is due to product not requiring funding in FY 202	21.				
<i>Title:</i> Field Medical Systems Advanced Development - PM Warfighter Health, Support Systems)	Performance and Evacuation (formerly PM Me	dical	5.559	4.461	1.209
Description: Funding is provided for the following effort in the development of combat casualty care and health care operations.	f products that support the medical mission in				
<i>FY 2020 Plans:</i> Nett Warrior Enhanced Physiological Sensors (Wearable): Will continue to col the development of wearable sensors. Will develop a concussion dosimeter w	laborate with Program Executive Office Soldier hich is part of the Integrated Soldier Sensor Sy	on stem.			
Semi-autonomous casualty evacuation (CASEVAC) Ground Platform (S-MET) a standardized Army Platform for the transport of a single casualty. Will transit): Will be adapting a medical evacuation packag tion to PE 0604807A Project 832.	ge to			
Transport Telemedicine Systems (TTS) (Formerly named Operational Virtual I develops MEDHUB (Medical Hands-free Ultra Wideband Broadcast), which wi data to provide lifesaving situational awareness of patient vitals en-route to the	Health): The Transport Telemedicine system ill automatically capture, store, and forward me e Medical Treatment Facility (MTF). Complete	dical			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020									
Appropriation/Budget Activity 2040 / 4	Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 040 / 4 PE 0603807A / Medical Systems - Adv Dev 836 / Field Medical Systems Advanced Development Development												
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2019	FY 2020	FY 2021								
prototype design and operational test for the MEDHUB platform. MEDHUB s awareness. Continue development of MEDHUB Drug Safety and Tracking p	supports Medical Treatment Facilities (MTF) situa eripheral.	ational											
FY 2021 Plans: Nett Warrior Enhanced Physiological Sensors (Wearable): Consolidated with Assessment below.	n, and funded under, Concussion Dosimetry for n	nTBI											
Concussion Dosimetry for mTBI Assessment: Prepare sensor and algorithms or transition to PE 654807 (0604807A)/832.	s for validation, verification and operational evalu	uation											
Transport Telemedicine Systems (TTS) (Formerly named Operational Virtua 1 airworthiness, cyber security and other certifications. Continue developmen system.	I Health): Initiate and complete MEDHUB Increm nt of MEDHUB Increment 2 Drug Safety and Tra	ient cking											
Next Generation Uniform Repellent/Impregnation: Project was completed an	d transitioned to PEO Soldier in FY 2020.												
FY 2020 to FY 2021 Increase/Decrease Statement: Funding decrease in FY 2021 is due to reorganization of PMOs.													
Title: Field Medical Systems Advanced Development - PM Tissue Injury and	Regenerative Medicine		-	1.736	-								
Description: Funding for engineering and manufacturing development of tis for enhanced medical capability and readiness	sue injury and regenerative medicine health proc	ducts											
<i>FY 2020 Plans:</i> Field Expedient Large Defect Bone Repair: Will initiate manufacturing of matinjured bones.	terial and pilot efficacy study for repair of damage	ed or											
Topical Burn Conversion Prevention Product: Continue to prepare for safety will be combined with Systemic Burn Conversion Prevention Product.	and effectiveness trials. Product development ef	fforts											
Systemic Burn Conversion Prevention Product: Continue to prepare for Phase Depending on FDA guidance at completion of Phase 2, will initiate pivotal stup patients are enrolled in and followed up outside of a randomized clinical trial.	se 2 clinical trial. Permanent Acellular Arterial Graudy and/or develop trauma registry (database that.	aft: at											
FY 2020 to FY 2021 Increase/Decrease Statement:													

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020)		
Appropriation/Budget Activity 2040 / 4	P roject (Number / 336 / Field Medica Development	oject (Number/Name) 5 I Field Medical Systems Advanced velopment				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021		
Funding decrease in FY 2021 due to reorganization of PMOs						
Title: Field Medical Systems Advanced Developmnet - PM Warfighter Brain He	3.170	-	-			
Title: FY 2020 SBIR/STTR Transfer		-	0.574	-		
Description: Funding transferred in accordance with Title 15 USC ?638						
<i>FY 2020 Plans:</i> 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 Subt	otals 15.676	14.107	12.226		
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A Remarks						

D. Acquisition Strategy

Develop in-house or industrial prototypes in government-managed programs to meet military and regulatory requirements for production and fielding.

ranced Target I Value of t Contract Jing Continuing	ns Advan	r/Name) cal System	(Number eld Medic	Project	ame)	mber/Na												
I Target Value of Contract			Project (Number/Name) 836 <i>I Field Medical Systems Advanced</i> <i>Development</i>				R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv Dev						Appropriation/Budget Activity 2040 / 4					
Target I Value of t Contract uing Continuing]	FY 2021 Total	2021 CO	FY 2 OC	FY 2021 Base		FY 2020		FY 2019		Management Services (\$ in Millions)						
uing Continuing	Total Cost	Cost To Complete	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Prior Years	Performing Activity & Location	Contract Method & Type	Cost Category Item			
	Continuing	Continuing	0.638		-		0.638		0.924		1.785	45.944	Not Applicable : Not applicable	Various	Medical Product Development Management Services Cost			
295 -	2.295	0.000	-		-		-		-		1.095	1.200	Not applicable : Not applicable	C/IDIQ	Medical Product Development Management Services Cost			
574 -	0.574	0.000	-		-		-		0.574		-	-	Various : Various	TBD	FY 2020 SBIR/STTR Transfer			
uing N/A	Continuing	Continuing	0.638		-		0.638		1.498		2.880	47.144	Subtotal					
			FY 2021 Total	2021 CO	FY 2021 OCO		FY 2021 Base		FY 2020		FY 2019		Product Development (\$ in Millions)					
Target Value of t Contract	Total Cost	Cost To Complete	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Prior Years	Performing Activity & Location	Contract Method & Type	Cost Category Item			
932 -	0.932	0.000	-		-		-		-		-	0.932	TBD : TBD	TBD	Product Development			
uing Continuing	Continuing	Continuing	-		-		-		-		2.811	3.909	ALL Product : Various	TBD	Medical Product Development			
778 -	8.778	0.000	-		-		-		-		-	8.778	TBD : TBD	TBD	Product Development of Freeze-dried plasma			
385 -	0.385	0.000	-		-		-		-		-	0.385	TBD : TBD	TBD	Point of Care Coagulation Profiler			
814 -	15.814	0.000	-		-		-		-		-	15.814	Banyan BioMarkers, Inc : Alachua FL	TBD	TBI Diagnostic Assay System - Increment II (benchtop/POC/ Bandits)			
048 -	3.048	0.000	-		-		-		-		-	3.048	Advance Circulatory Systems Inc. : Roseville, MN	TBD	Impedance Threshold Device for the Treatment of Traumatic Brain Injury			
871 -	1.871	0.000	-		-		-		-		-	1.871	Twinstar : Minniapolis, MN	TBD	Compartment Syndrome Pressure Device			
841 -	0.841	0.000	-		-		-		-		-	0.841	Gaia Medical : LaJolla CA	TBD	Hydration Status Monitor			
2.2 0.3 innu oras 0.3 0.3 15.4 0.3 0.4 1.2 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4		Continuing Cost To Complete 0.000 Continuing Cost To Complete 0.000 Continuing 0.000 0.000 0.000 0.000 0.000 0.000 0.000	- 0.638 FY 2021 Total Cost	2021 CO Award Date	- - - - - - - - - - - - - - - - - -	021 Se Award Date	- 0.638 FY 20 Bas Cost	020 Award Date	- 0.574 1.498 FY 2 Cost - - - - - - - - -	019 Award Date	1.095 - 2.880 FY 2 Cost - 2.811 - - - - - - -	1.200 - 47.144 Prior Years 0.932 3.909 8.778 0.385 15.814 3.048 1.871 0.841	Not applicable : Not applicable Various : Various Subtotal Illions) Performing Activity & Location TBD : TBD ALL Product : Various TBD : TBD ALL Product : Various TBD : TBD Banyan BioMarkers, Inc : Alachua FL Advance Circulatory Systems Inc. : Roseville, MN Twinstar : Minniapolis, MN Gaia Medical : LaJolla CA	C/IDIQ TBD t (\$ in Mi Contract Method & Type TBD TBD TBD TBD TBD TBD TBD TBD TBD	Medical Product Development Management Services Cost FY 2020 SBIR/STTR Transfer Product Development Product Development Product Development Medical Product Development Product Development Product Development Product Development Product Development of Freeze-dried plasma Point of Care Coagulation Profiler TBI Diagnostic Assay System - Increment II (benchtop/POC/ Bandits) Impedance Threshold Device for the Treatment of Traumatic Brain Injury Compartment Syndrome Pressure Device Hydration Status Monitor			

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Exhibit R-3, RDT&E F	Project Co	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4						R-1 Pro PE 060	ogram Ele 3807A / <i>N</i>	ement (N /ledical S	umber/N ystems - ,	ame) Adv Dev	Project (Number/Name) 836 <i>I Field Medical Systems Advanced</i> <i>Development</i>				
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 Neuromodulator TBI	TBD	TBD : TBD	4.277	-		-		-		-		-	0.000	4.277	-
PTSD	Various	TBD : Various locations	4.275	-		-		-		-		-	0.000	4.275	-
Temporary Corneal Repair	C/Various	Ashvattha Therapeutics, LLC , University of Southern California, Institute of Surgical Research : Redwood City, CA, Los Angeles, CA, San Antonio, TX	5.040	1.795		2.293		4.548		-		4.548	0.000	13.676	-
Extracorporeal Life Support (ECLS) (Formerly ECMO)	Various	Medical Technology Enterprise Consortion : Summerville SC	-	-		-		3.201		-		3.201	0.000	3.201	-
Field Sterilizer	TBD	TBD : TBD	3.515	3.021		-		-		-		-	0.000	6.536	-
Product Development	TBD	HemCon Medical Technologies : Tigard, Oregon	9.720	-		-		-		-		-	10.342	20.062	-
Product Development	TBD	Banyan BioMarkers, Inc : Alachua FL	31.514	-		-		-		-		-	Continuing	Continuing	Continuing
Non-invasive neuro assessment device (NINAD)	C/Various	TBD : TBD	0.800	-		-		-		-		-	0.000	0.800	-
Cold Stored Platelets in Platelet Additive Solution (CSP-PAS) (Formerly Advanced Refrigerated Platel	C/Various	TBD : TBD	-	-		4.570		-		-		-	0.000	4.570	-
Transport Telemedicine Systems (TTS) - MEDHUB	TBD	TBD : TBD	-	0.350		1.928		-		-		-	Continuing	Continuing	Continuing
Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	2020	
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Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 0603	gram El 3807A / <i>N</i>	ement (N Medical S <u>j</u>	umber/Na ystems - /	ame) A <i>dv Dev</i>	Project 836 / Fi Develoj	(Numbe ield Medic oment	r/Name) cal Systen	ns Advan	ced
Product Developmer	nt (\$ in M	illions)		FY 2	2019	FY 2	020	FY 2 Ba	2021 se	FY 2	2021 CO	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
Platform (Formerly named Operational Virtual Health)															
Extremity Injury Repair (formerly Permanent Acellular Graft)	TBD	SS/CPFF : HumaCyte: Morrisville, NC	-	1.778		0.931		2.695		-		2.695	Continuing	Continuing	Continuing
Nett Warrior Enhanced Physiological Sensors (Wearable)	TBD	Various : Various	-	-		1.081		-		-		-	Continuing	Continuing	Continuing
		Subtotal	94.719	9.755		10.803		10.444		-		10.444	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY 2	2019	FY 2	020	FY 2 Ba	2021 se	FY 2 OC	2021 CO	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	Not Applicable : Not applicable	47.012	2.429		1.128		1.144		-		1.144	Continuing	Continuing	Continuing
	1	Subtotal	47.012	2.429		1.128		1.144		-		1.144	Continuing	Continuing	N/A
Remarks No product/contract costs g	greater than	\$1M individually.										_			
Test and Evaluation	(\$ in Milli	ions)		FY 2	2019	FY 2	020	FY 2 Ba	2021 se	FY 2 O(2021 CO	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	TBD	Not applicable : Not applicable	38.664	0.612		0.678		-		-		-	Continuing	Continuing	Continuing
		Subtotal	38.664	0.612		0.678		-		-		-	Continuing	Continuing	N/A
Remarks No product/contract costs g	greater than	\$1M individually.										-			

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	2021 Arm	у							Date:	February	2020	
Appropriation/Budget Activity 2040 / 4				gram Ele 3807A / <i>N</i>	ement (N Medical S	umber/N ystems - /	ame) A <i>dv Dev</i>	Project (Number/Name) 836 / Field Medical Systems Advanced Development				
	Prior Years	FY 2019	FY 2	020	FY 2 Ba	2021 Ise	FY 2 OC	021 O	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	227.539	15.676	14.107		12.226		-		12.226	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Army							Date: February	2020			
Appropriation/Budget Activity 2040 / 4		F	R-1 Program Element (Number/Name)Project (Number/Name)PE 0603807A I Medical Systems - Adv Dev836 I Field Medical Systems Adva Development									
	1				1				1			
Event Name	FY 2019	FY 202	20	FY 2021	FY 2022	1	FY 2023	FY 2024	FY 2025			
Temporary Corneal Repair												
Temporary Corneal Repair -Prototype Testing	R&D development											
Temporary Corneal Repair- Clinical Study	Prototype Lesung			Notes Study								
Noninvasive Neuro Assessment Device development (NINAD)	R&D development			unital Study								
Cold Stored Platelets in Platelet Additive solution	R&D development											
Transport Telemedicine Systems (TTS)- MEDHUB Platform	R&D development											
Transport Telemedicine Systems (TTS)- MEDHUB Drug Safety	R&D development											
Extremity Injury Repair (Per. Acellular Arterial Graft) - Vascular F	R&D development											
Permanent Acellular Arterial Graft - Vascular MS B				R&D developmen	nt							
Extremity Injury Repair - Vascular- Environmental Testing/Oper	ational Testing		E	Environmental Testing/Op	erational Testing							
Extracorpeal Life Support- Developmental Contract			Develop	omental Contract								
L					11			1	1]			

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv Dev	Project (N 836 / Field Developme	umber/Name) Medical Systems Advanced ent

Schedule Details

	Sta	art	End		
Events	Quarter	Year	Quarter	Year	
Temporary Corneal Repair	2	2016	1	2023	
Temporary Corneal Repair -Prototype Testing	2	2018	1	2020	
Temporary Corneal Repair- Clinical Study	1	2021	4	2022	
Noninvasive Neuro Assessment Device development (NINAD)	1	2018	1	2025	
Cold Stored Platelets in Platelet Additive solution	4	2017	4	2023	
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 (Per. Acellular Arterial Graft) - Vascular Pivotal Study	1	2019	1	2021	
Permanent Acellular Arterial Graft - Vascular MS B	2	2021	2	2021	
Extremity Injury Repair - Vascular- Environmental Testing/Operational Testing	1	2021	1	2022	
Extracorpeal Life Support- Developmental Contract	4	2020	4	2021	

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	Army							Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4	Appropriation/Budget Activity 2040 / 4 Prior EV 2						t (Number / al Systems	Project (N CS4 / MEL INITIATIVE	t (Number/Name) MEDICAL SYSTEMS ADV DEV TIVES (CA)			
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
CS4: MEDICAL SYSTEMS ADV DEV INITIATIVES (CA)	-	5.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Congressional Interest Item fundi Demonstration for MEDHUB to pr paramedic tasks.	ng for medi rovide Medi	ical systems ical Treatme	s advanced ent Facility (developme MTF) autor	nt initiatives natic situati	s in Transpo onal awarei	ort Telemedi ness system	cine - Initia to identify	te Joint Adv patients en	ranced Tech -route to M	nnology TFs and auto	mate
B. Accomplishments/Planed P			<u>sj</u>					FY 2019	FY 2020	-		
		е 						5.000	-			
FY 2019 Accomplishments: Tra	nsport Tele	medicine			0		0	F 000		-		
					Congress	lional Adds	Subtotals	5.000	-]		
<u>C. Other Program Funding Sum</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A	<u>mary (\$ in</u>	<u>Millions)</u>										

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budg 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A <i>I Medical Systems - Adv Dev</i>							Project (Number/Name) ⁷ CS4 / MEDICAL SYSTEMS ADV DEV INITIATIVES (CA)							
Product Developme	nt (\$ in Mi	llions)		FY 2	2019	FY 2	:020	FY 2 Ba	2021 ase	FY 2 OC	021 CO	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
Telemedicine product development	C/TBD	TBD/ : TBD	7.500	5.000		-		-		-		-	0.000	12.500	-
		Subtotal	7.500	5.000		-		-		-		-	0.000	12.500	N/A
			Prior Years	FY 2	2019	FY 2	020	FY 2 Ba	2021 ase	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	7.500	5.000		0.000		-		-		-	0.000	12.500	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A		Date: February 2020									
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (Number/Name)PE 0603807A / Medical Systems - Adv DevCS4 / MEDICAL SYSTEMS ADV DEVINITIATIVES (CA)									
E	FY 2019	FY 20	20	FY 2021	FY 2022	I	FY 2023	FY 2024	FY 2025		
Event Name	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1	2 3 4	1 2 3 4	1 2 3 4		
Telemedicine product development (MEDHUB) - Develop MED	ptotype					1					
Telemedicine product development (MEDHUB) - Peripheral Inte						I					
Telemedicine product development (MEDHUB) - Software Deve	ent					I					
						1					
						I					
						1					
						1					
						1					
						1					
						1					
						1					
						1					
						I					

hibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Febru	ary 2020
Propriation/Budget Activity R 40 / 4 P	-1 Program Element (Number E 0603807A / Medical Systems	r/ Name) s - Adv Dev	Project (Number/Name CS4 I MEDICAL SYSTE INITIATIVES (CA)	e) EMS ADV DEN
Sche	dule Details	art	En	d
Events	Quarter	Year	Quarter	Year
Telemedicine product development (MEDHUB) - Develop MEDHUB Prototyp	pe 2	2018	1	2019
Telemedicine product development (MEDHUB) - Peripheral Integration	1	2018	1	2010
				2019

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	Army							Date: Fe	bruary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 060380	am Elemen)7A <i>I Medic</i>	t (Number/ al Systems	' Name) - Adv Dev	Project FF4 / C & Demo	(Number/N ounterdrug, onstration	ame) DDR, Sys De	velopment
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 202	24 FY 202	Cost To 5 Complete	Total Cost
FF4: Counterdrug, DDR, Sys Development & Demonstration	-	2.296	0.000	0.000	-	0.000	0.000	0.000	0.0	0.0 0.0	0.000 00	2.296
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-		-	-	
(FIDIL) information management is comprised of several variations corresponding chain-of-custody of B. Accomplishments/Planned P	nt system us s of a deskte documents. Programs (S	sed to test u op applicatio This Projec \$ in Million s	urine sample on used to s at will standa <u>s)</u>	es for the pr elect servic ardize DTP-	resence of i ce members ·CSS across	llegal drugs s for random s all service	. The Drug n drug testir s and migra	Testing Pro ng, prepare te it to a We	gram - C labels fo eb-basec	lient Collect r urine speci l system. FY 2019	ion System (L men bottles, a	TP-CSS) and print
Title: Counterdrug, DDR, Sys De	velopment	& Demonstr	ration							2.296	-	-
					Accomplis	shments/Pl	anned Prog	grams Sub	totals	2.296	-	-
<u>C. Other Program Funding Sum</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A	<u>ımary (\$ in</u>	<u>Millions)</u>										

Exhibit R-3, RDT&E I							Date:	February	2020						
Appropriation/Budge 2040 / 4	et Activity	,	R-1 Program Element (Number/Name)Project (NuPE 0603807A / Medical Systems - Adv DevFF4 / Count& Demonstr							(Number ounterdru nstration	r/ Name) g, DDR, S	Sys Deve	lopment		
Product Developmer	nt (\$ in Mi	llions)	ſ	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/UCA	Alliant Corps LLC : San Antonio, TX	12.400	2.296		-		-		-		-	0.000	14.696	-
		Subtotal	12.400	2.296		-		-		-		-	0.000	14.696	N/A
			Prior Years	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	12.400	2.296		0.000		-		-		-	0.000	14.696	N/A

Remarks

Appropriation/Budget Activity R-1 Program Ele 2040 / 4 PE 0603807A / M Event Name FY 2019 FY 2020 FY 2020 1 2 3 4 1 2 3 Coding and Development Testing User Testing Image: Code of the set o	Element (Number/Name) Project (Number/Name) ' Medical Systems - Adv Dev FF4 / Counterdrug, DDR, Sys Development & Demonstration 021 FY 2022 FY 2023 FY 2024 FY 2025 3 4 1 2 3 4 1 2 3 4
Event Name FY 2019 FY 2020 FY 2020 1 2 3 4 1 2 3 Coding and Development Testing User Testing Image: Contract of the second sec	021 FY 2022 FY 2023 FY 2024 FY 2025 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
1 2 3 4 1 2 3 4 1 2 3 Coding and Development Testing User Testing Image: Control of the second	3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
Coding and Development Testing User Testing	
User Testing	

		Date	e: February 2020		
R-1 Program Element (Number PE 0603807A / Medical Systems	r/ Name) s - Adv Dev	Project (Numb FF4 / Counterdr & Demonstratio	: (Number/Name) ounterdrug, DDR, Sys Developmer onstration		
chedule Details					
Start			End		
Quarter	Year	Quart	er Year		
2	2017	2	2017		
3	2017	1	2019		
Ū					
	R-1 Program Element (Number PE 0603807A / Medical Systems chedule Details Sta Quarter 2 3	R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv Dev chedule Details Start Quarter Year 2 2017 3 2017	Date R-1 Program Element (Number/Name) Project (Numb PE 0603807A / Medical Systems - Adv Dev FF4 / Counterdia Chedule Details FF4 / Counterdia Chedule Details Quarter Year Quarter 2 2017 2 3 2017 1		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	Army							Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4		R-1 Progr PE 060380	am Elemen 07A <i>I Medica</i>	t (Number al Systems	' Name) - Adv Dev	Project (N VS7 I MEL Package (I	umber/Na DEVAC Mis MEP) - Adv	me) sion Equipm ⁄ Dev	nent			
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
VS7: MEDEVAC Mission Equipment Package (MEP) - Adv Dev	-	0.293	6.093	0.302	-	0.302	0.311	0.000	0.000	0.000	0.000	6.999
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
retrofits MEDEVAC legacy helico and Future Vertical Lift. The Mede future conflicts by evacuating wou (VCSA) approved the force desig life-cycle management of the MEI mission equipment. All products f	pters to ac evac Missio unded troop n update ir DEVAC ME rom this Pr	nieve the me on Equipme os quickly w acreasing the EP from PEC oject will tra	edical capat nt on the Ar hile providir e number of O Aviation. (nsition to P	bility provide my MEDEV og good car air frames Dngoing res E 0604807	ed by a limi /AC helicop e enroute. for MEDE\ search and A/Project V	ted number oters is critica To better me /AC compar design effor S8.	of mission al to mainta eet operatic nies. In 201 ts are requ	specific ME aining high L anal needs, i 0, the Army ired to prepa	DEVAC hel JS troop sui n 2009 the Medical De are and opti	icopters, to rvival rates Vice Chief epartment (imize the M	o include Bla during curre of Staff of th US Army) ad IEDEVAC flo	ckhawk ent and ne Army ccepted eet with
B. Accomplishments/Planned P	rograms (\$ in Million	s <u>)</u>						FY	2019	FY 2020	FY 2021
Title: Medical Evacuation Develop	pment									0.293	0.279	0.302
Description: This effort involves a configuration for performing necess and prototypes to ensure parameter MEDEVAC Missions.	Aeromedic ssary life-sa dic skills ar	al Evacuatic aving param nd tasks are	n Cabin and ledic-level ta performed t	d Technolo asks. Effort to standard	gy Researc s will develo l to save So	h to determi op patient ha Idiers? lives	ne the optii andling sys during poir	mum space tem compor nt of injury	and nents			
FY 2020 Plans: Future Vertical Lift (FVL) and UHC System Design (Medical Evacuati Continue to develop and design o patients during MEDEVAC Missio paramedics have the ability to per modernization of the UH60 helicop mission flexibility.	60 Aerome on Advanc ptimum he ns. Contin form life-sa pter medica	dical Evacua ed Develop licopter cabi ue to develo aving tasks i al interior sy	ation Cabin ment): In space cor op patient ha n both curre stem by red	Space and nfiguration a andling sys ent and futu lucing weig	Technology and illumina tem compo ire evacuati ht and desi	y Research a ation so med nents and p on platforms gning modul	and Patient lics can effe rototypes to s. Initiate p larity allowi	t Handling ectively trea o ensure lanning for ng greater	t			
FI 2021 FIAIIS.												

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020							
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)Program Element (Number/Name)Program Element (Number/Name)PE 0603807A / Medical Systems - Adv DevVSPart							
B. Accomplishments/Planned Programs (\$ in Millions)				FY 2019	FY 2020	FY 2021		
Future Vertical Lift (FVL) Aeromedical Evacuation Patient Handling System Deshandling system for Future Vertical Lift so medics can effectively treat patients of	sign: Continue to develop and desig during MEDEVAC Missions.	n patient						
FY 2020 to FY 2021 Increase/Decrease Statement: Increase in FY 2021 due to projected requirements of the program.								
Title: FY 2020 SBIR/STTR Transfer				-	0.014	-		
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 Prog	rams Sub	totals	0.293	0.293	0.302		
		FY 2019	FY 202	0				
Congressional Add: Transport Telemedicine		-	5.8	00				
FY 2020 Plans: Transport Telemedicine								
	Congressional Adds Subtotals	-	5.8	00				
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>								
D. Acquisition Strategy Develop in-house or industrial prototypes in government-managed programs to	o meet military MEDEVAC and regu	latory requ	uirements	for produc	tion and fieldi	ng.		

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020			
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv DevProject (Number/Name) VS7 / MEDEVAC Mission Package (MEP) - Adv Dev						r/ Name) Mission E Adv Dev	Equipmer	nt			
Management Service	es (\$ in M	illions)		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 Services Cost	Various	APM MEDEVAC PEO Aviation : Huntsville, AL	0.318	0.293		3.054		0.302		-		0.302	0.000	3.967	-		
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.014		-		-		-	0.000	0.014	-		
		Subtotal	0.318	0.293		3.068		0.302		-		0.302	0.000	3.981	N/A		
Product Development (\$ in Millions)			FY	2019	FY 2	2020	FY 2 Ba	2021 ise	FY 2021		FY 2021						
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 Cost	TBD	APM MEDEVAC PEO Aviation : Huntsville AL	1.624	-		3.025		-		-		-	0.000	4.649	-		
		Subtotal	1.624	-		3.025		-		-		-	0.000	4.649	N/A		
Support (\$ in Million	5)			FY	2019	FY 2	FY 2020		FY 2021 Base		FY 2021 OCO		2021 FY 2021 CO 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	TBD	APM MEDEVAC PEO Aviation : Huntsville, AL	0.911	-		-		-		-		-	0.000	0.911	-		
		Subtotal	0.911	-		-		-		-		-	0.000	0.911	N/A		
					1							1					

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv Dev					Project (Number/Name) VS7 I MEDEVAC Mission Equipment Package (MEP) - Adv Dev			nt	
Test and Evaluation (\$ in Millions)				FY 2	2019	FY 2	020	FY 2 Ba	2021 Ise	FY 2 O	2021 CO	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	MIPR	APM MEDEVAC PEO Aviation : Huntsville, AL	0.199	-		-		-		-		-	0.000	0.199	-
		Subtotal	0.199	-		-		-		-		-	0.000	0.199	N/A
P		Prior Years	FY 2	2019	FY 2	FY 2021 FY 2 FY 2020 Base OC		2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract			
	Project Cost Totals 3.052					6.093		0.302		-		0.302	0.000	9.740	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	vrmy						Date: February	2020
Appropriation/Budget Activity 2040 / 4		R-1 Program Elen PE 0603807A / <i>Me</i>	nent (Number/Nam dical Systems - Adv	oject (N 67 / MEL ackage (Number/Name) DEVAC Mission Equipment (MEP) - Adv Dev			
Event Name	FY 2019	FY 202	20 FY 2021	FY 2022	FY :	2023	FY 2024	FY 2025
Future Vertical Lift (FVL) and UH60 Aeromedical Evac Cabin Sp	1 2 3 4	1 2 3				3 4	1 2 3 4	1 2 3 4

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Februa	ary 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (N PE 0603807A / Medical S	(Number/Name) EDEVAC Mission Equipment e (MEP) - Adv Dev			
Sch	edule Details				
	[Start		En	4
		Start			u i i i i i i i i i i i i i i i i i i i
Events	Quart	er Year	C	uarter	Year
Events Future Vertical Lift (FVL) and UH60 Aeromedical Evac Cabin Space and Te	Quart echnology 1	er Year 2017	C	luarter 4	Year 2024

Exhibit R-2, RDT&E Budget Item	Justificat	ion: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0603827A / Soldier Systems - Advanced Development							
COST (\$ in Millions) Prior Years FY 2019 FY 2020 Base						FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	30.384	26.113	26.138	-	26.138	30.945	33.961	28.535	32.332	Continuing	Continuing
CF2: Integrated Soldier Systems Prototyping (SL CFT)	-	0.000	1.959	2.541	-	2.541	3.149	3.771	3.843	3.881	0.000	19.144
ET8: Personnel Airdrop System Development	-	0.396	0.297	1.266	-	1.266	1.264	1.811	0.999	0.999	Continuing	Continuing
S53: Clothing And Equipment	-	1.765	6.466	1.808	-	1.808	2.414	4.474	5.073	8.726	Continuing	Continuing
S54: Small Arms Improvement	-	7.395	14.555	16.082	-	16.082	19.213	17.423	10.477	10.583	0.000	95.728
VS4: Soldier Protective Equipment	-	20.828	2.836	4.441	-	4.441	4.905	6.482	8.143	8.143	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE), Advanced Component Development and Prototypes, manages the Soldier as a system to increase combat effectiveness, test and deliver tangible products that save Soldiers lives and improve combat capability. The PE provides funding for evaluating, developing, and testing emerging technologies and critical Soldier support systems to reduce technology risk.

CF2

The Integrated Squad effort includes the completion of the Adaptive Squad Architecture (ASA) and Squad Performance Model (SPM) programs. Both of these efforts are Program Executive Office-Soldier (PEO-S) led and will develop a full system architecture for the Soldier and the Squad. This will be accomplished by developing Interface Control Documents (ICDs) in order to provide common established interfaces for internal and external stakeholders who will interface on or with the Soldier platform. A critical part of this effort is development of the "Squad as an Integrated Platform" vision based on threat, operational environment and collaboration with internal and external stakeholders to inform investment decisions out to FY 2050. The ASA will develop a metric-based approach that will include live, virtual and constructive evaluations and tools across the Department of Defense (DoD), academia and industry which will be used for senior leaders to make deliberate decisions based on the analysis of Soldier/ Squad performance

ET8

Personnel Airdrop System supports efforts to improve Low Altitude and High Altitude personnel parachutes and associated equipment to include canopy improvement based on integration of new technology with the goal of enhancing the insertion capability and safety of the airborne Soldier and increasing the performance, reliability, and durability of personnel airdrop equipment.

S53

This Project supports efforts to evaluate and integrate technologies and representative or prototype systems that help expedite Soldier Clothing and Individual Equipment technology transition from the laboratory to operational use. Efforts focus on proving out commonality across as broad a spectrum of users as possible to

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced	R-1 Program Element (Number/Name) PE 0603827A / Soldier Systems - Advanced Developme	nt
Component Development & Prototypes (ACD&P)		

provide a modular, integrated uniform/clothing system from skin out and head-to-toe. It funds efforts to transition new technologies and domestically available fabrics with Flame Resistant (FR), moisture wicking, insect protection and camouflage technologies, including integration of fabrics appropriate for uniforms and equipment used in jungle/tropical and arctic environments. New technologies are indentified to monitor health and improve Soldier survivability, reduce weight, and improve affordability, mobility and comfort in combat and training/administrative environments. Includes integration and interface on the Soldier system.

S54

The Small Arms Improvement Advanced Component Development and Prototypes (ACD&P) program provides funds to mature, demonstrate, test and evaluate emerging technology from Budget Activity (BA) 3 Program Element 0603607A Joint Service Small Arms Program (JSSAP) Project 627 Defense Advanced Research Projects Agency (DARPA), Department of Energy National Laboratories, Research Development & Engineering Centers (RDECs) and other domestic and foreign sources for small arms weapon systems and technology. Small arm weapon systems include weapons ranging up to 40 millimeter in caliber. Current and future efforts focus on improvements designed to enhance lethality, target acquisition and tracking, fire control, usability, training effectiveness and reliability of weapons to include ammunition when developing and/or evaluating standard and non-standard weapons. Focus areas include the maturing of technology through testing and evaluation of sub-system or system prototypes which demonstrates light weight materials, wear resistant/protective/anti-reflective coatings, observation/situational awareness improvements, human-systems integration, robotic armament capability, non-lethal capability, and equipment enhancements. Benefits include continuous improvements to small arms weapon systems, fire control equipment, optics, gun barrels, training devices, suppressors, component mounts, weapon mounts, and weapon/ammunition interface. Includes costs associated with efforts for integration and interface of products on Soldiers' head, body and weapons.

VS4

This Project supports efforts to evaluate integrated technologies and representative or prototype systems that help expedite Personal Protective Equipment (PPE) technology transition from the laboratory to operational use.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	31.022	22.113	26.161	-	26.161
Current President's Budget	30.384	26.113	26.138	-	26.138
Total Adjustments	-0.638	4.000	-0.023	-	-0.023
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	4.000			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-0.638	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	-0.023	-	-0.023

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date	: February 202	20
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603827A <i>I Soldier Systems - Advanced Development</i>		
Congressional Add Details (\$ in Millions, and Includes General F	Reductions)	FY 2019	FY 2020
Project: S53: Clothing And Equipment	-		
Congressional Add: Cold Weather Clothing		-	4.000
	Congressional Add Subtotals for Project: S53	-	4.000
	Congressional Add Totals for all Projects	-	4.000

Exhibit R-2A, RDT&E Project Ju	chibit R-2A, RDT&E Project Justification: PB 2021 Army										uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060382 Developme	Im Element (Number/Name)Project (Number/Name)7A I Soldier Systems - AdvancedCF2 I Integrated Soldier SystemsentPrototyping (SL CFT)						
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
CF2: Integrated Soldier Systems Prototyping (SL CFT)	-	0.000	1.959	2.541	-	2.541	3.149	3.771	3.843	3.881	0.000	19.144
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Verify and maintain tools that provide Systems Engineering, Configuration Management, and Evaluations in a virtual and physical environment. Verify and maintain the Adaptive Squad Architecture (ASA) and Squad Performance Model (SPM) with emphasis on development of ICDs, specifically to support the rapid integration of the Soldier Lethality Cross Functional Team (SL CFT) priority programs with all other equipment the dismounted Soldier will use. Provide prototyping of capabilities for evaluation and integration. Execute evaluation of new measurements and methodologies from the S&T community, execute system level evaluation environments, and support Soldier system modeling. Funding for this project aligns with the Army's priorities in support of the National Defense Strategy and is a priority of the Soldier Lethality Cross Functional Team. FY 2020 RDTE funding in the amount of \$1.959M will finalize an initial ASA and SPM, consisting of 3 critical products: the Configuration Database (CD), the Architectural Assessment Tool (AAT) and the SPM.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Integrated Soldier Systems Prototyping	-	1.870	2.541
Description: Verify and maintain tools that provide Systems Engineering, Configuration Management, and Evaluations in a virtual and physical environment. Verify and maintain the ASA and SPM with emphasis on development of ICDs, specifically to support the rapid integration of the Soldier Lethality Cross Functional Team (SL CFT) priority programs with all other equipment the dismounted Soldier will use. Provide prototyping of capabilities for evaluation and integration. Execute evaluation of new measurements and methodologies from the S&T community, execute system level evaluation environments, and support Soldier system modeling. Funding for this project aligns with the Army's priorities in support of the National Defense Strategy and is a priority of the Soldier Lethality Cross Functional Team			
Finalize operational version of ASA and SPM			
FY 2021 Plans: Accelerate the development of components, algorithms, and demonstrations in support of Squad as an Integrated Combat Platform			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Just	ification: PB	2021 Army							Date: Fel	bruary 2020	
Appropriation/Budget Activity 2040 / 4				R-1 Pi PE 06 Develo	r ogram Eler 03827A / Sc opment	nent (Numb Idier System	er/Name) as - Advanced	d CF2 I In Prototyp	(Number/Na tegrated Solo bing (SL CFT	ime) dier Systems)	3
B. Accomplishments/Planned Pro	grams (\$ in N	<u>/lillions)</u>							FY 2019	FY 2020	FY 2021
FY 2020 to FY 2021 increase in req personal protection, electronics con	uired funding nectivity, pow	due to increa er and energ	ased trade-o ly, user inter	ff analysis o faces, and d	f technology lisplay conte	integration v	with Soldiers'				
Title: FY 2020 SBIR/STTR Transfe	•								-	0.089	-
Description: Funding transferred in	accordance	with Title 15	USC ?638								
FY 2020 Plans: Funding transferred in accordance	vith Title 15 U	SC ?638									
FY 2020 to FY 2021 Increase/Deck Funding transferred in accordance	rease Statem with Title 15 U	ent: SC ?638									
				Accon	nplishment	s/Planned P	rograms Su	btotals	-	1.959	2.541
C. Other Program Funding Summ	ary (\$ in Milli	ons)									
			FY 2021	FY 2021	<u>FY 2021</u>					Cost To	
Line Item • CF3: Integrated Soldier Systems (SL CFT) Remarks	<u>FY 2019</u> -	<u>FY 2020</u> 4.504	<u>Base</u> 4.597	<u>000</u> -	<u>Total</u> 4.597	<u>FY 2022</u> 4.425	<u>FY 2023</u> 4.498	<u>FY 2024</u> 4.580	FY 2025 4.626	<u>Complete</u> 0.000	<u>Total Cost</u> 27.230
<u>Nemarka</u>											

D. Acquisition Strategy

Develop and validate the verification and operation of the ASA tools (Configuration Database (CD), Architectural Assessment Tool (AAT), Squad Performance Model (SPM)) under full and open competition. Attempt to utilize one vendor for, at a minimum, maintenance of the CD and AAT. Conduct evaluations to support the SPM, with the Government acting as the lead developer.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2								Date:	February	2020			
Appropriation/Budge 2040 / 4		R-1 Pro PE 060 Develo	o gram Ele 3827A / S o <i>ment</i>	e ment (N Soldier Sy	lumber/Na /stems - A	ame) Idvanced	Project CF2 / Ir Prototy	t (Numbe ntegrated ping (SL (r/ Name) Soldier S <u>.</u> CFT)	ystems					
Management Service	es (\$ in N	lillions)		FY	2019	FY 2020		FY : Ba	2021 ase	FY	2021 CO	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	-	-		0.089		-		-		-	0.000	0.089	-
		Subtotal	-	-		0.089		-		-		-	0.000	0.089	N/A
Product Developmer	oduct Development (\$ in Millions)				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
Adaptive Soldier Architecture (ASA) Squad Performance Model (SPM)	C/FFP	TBD : TBD	-	-		0.455	Jan 2020	0.500	Jan 2021	-		0.500	Continuing	Continuing	Continuing
		Subtotal	-	-		0.455		0.500		-		0.500	Continuing	Continuing	N/A
Test and Evaluation	Subtotal 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
ASA/SPM Test & Eval	C/FFP	TBD : TBD	-	-		1.415		2.041	Dec 2020	-		2.041	Continuing	Continuing	Continuing
		Subtotal	-	-		1.415		2.041		-		2.041	Continuing	Continuing	N/A
			Prior Years	FY	2019	FY	2020	FY : Ba	2021 ase	FY	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		1.959		2.541		-		2.541	Continuing	Continuing	N/A
Romarks															

Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) Project (Number/Name) 204014 PC 0003827A I Soldier Systems - Advanced CF2 I Integrated Soldier Systems prototyping (SL CF7) Event Name FY 2019 FY 2020 FY 2021 FY 2022 FY 2023 FY 2024 FY 2025 ASA SPM Implementation 1 2 3 4 1 4 1 4 1 4 4 4 4 4 4 4 4 4 4 4 4 4	Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	vrmy					Date: February	2020		
Event Name FY 2019 FY 2020 FY 2021 FY 2022 FY 2023 FY 2024 FY 2026 1 2 3 4 1 2 3	Appropriation/Budget Activity 2040 / 4		R-1 PE 0 <i>Deve</i>	Program Elemer 603827A / Soldie elopment	d CF2 I Inte Prototypir	roject (Number/Name) F2 I Integrated Soldier Systems rototyping (SL CFT)				
I I	Event Name	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025		
ASA SPM Implementation	Event Name	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4 1	2 3 4	1 2 3 4	1 2 3 4		
	ASA SPM Implementation									

hibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febru	ary 2020						
propriation/Budget Activity 40 / 4	R-1 Progra PE 0603827 <i>Developmer</i>	R-1 Program Element (Number/Name)Project (Number/Name)PE 0603827A / Soldier Systems - AdvancedCF2 / Integrated Soldier SystemDevelopmentPrototyping (SL CFT)									
	Schedule Deta	ails									
		Sta	art	En	d						
Events		Quarter	Year	Quarter	Year						
ASA SPM Implementation		2	2020	4	2024						

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2021 A	Army							Date: Fe	bruary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 060382 Developm	am Elemen 27A I Soldie ent	er Systems	Project (N ET8 / Pers Developm	lumber/N sonnel Aird ent	ame) drop 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 202	Cost To 5 Complete	Total Cost
ET8: Personnel Airdrop System Development	-	0.396	0.297	1.266	-	1.266	1.264	1.811	0.999	0.99	99 Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-		-	
Funding in this project supports to and High Altitude personnel para the insertion capability and safety transition capabilities from our So service initiatives to improve com	he Army's (achutes and y of the airb cience and monality.	Cross Funct associated orne Soldie Technology	ional Teams equipment r and increa partners to	s (CFT) initi to include of asing the pe increase p	iatives. Pro canopy impr erformance, erformance	ject ET8, Pe rovement ba reliability, a and safety	ersonnel Air ased on inte Ind durabilit of Soldier c	rdrop Syste gration of n y of person lothing and	m, supports iew technol nel airdrop equipment.	efforts to ogy with tl equipmen It will co	improve Low ne goal of en t. This projec ntinue to sup	v Altitude hancing ct will port cross-
B. Accomplishments/Planned F	Programs (\$ in Million	<u>s)</u>						F۱	2019	FY 2020	FY 2021
<i>Title:</i> Personnel Airdrop System <i>Description:</i> Improve Low Altitud improvements based on integrati and increasing the performance, <i>FY 2020 Plans:</i> Evaluate Low Altitude Static Line	Developme de and High on of new te reliability, a Automatic	nt Altitude pe echnology w nd durability Activation D	rsonnel par <i>v</i> ith the goal y of personr Devices as v	achutes and of enhanci nel airdrop e vell as Univ	d associated ing the inser equipment. ersal Static	d equipmen rtion and sa Line smart	t to include fety of the a snap hook a	canopy airborne sole	dier	0.396	0.283	1.266
Recovery Systems. FY 2021 Plans: Continue evaluation of Low Altitu Activation Device (T-11R AAD)) a FY 2020 to FY 2021 Increase/D	de Static Lin and begin e ecrease Sta	ne Automati valuation of atement:	ic Activatior Smart Univ	n Devices (r versal Static	now called T : Line Snap	11 RAAD o Hook (SUS	or T11 Rese H).	rve Automa	itic			
Automatic Activation Device (T-1 technology.	rdrop Syste 1R AAD) ar	em Developi nd the initial	ment portfol evaluation	of the Smai	tne continu rt Universal	ed developi Static Line	ment of the Snap Hook	I-11 Reser (SUSH)	ve			
Title: FY 2020 SBIR/STTR Trans	sfer									-	0.014	-
Description: Funding transferred	l in accorda	nce with Tit	le 15 USC '	?638								

FY 2020 Plans:

PE 0603827A: Soldier Systems - Advanced Development Army

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3 2021 Army					Date: February 2020				
		R-1 Pi PE 06 <i>Devel</i>	r ogram Ele r 03827A / So opment	nent (Numb oldier System	Projec ET8 / F Develo				
<u>Millions)</u>							FY 2019	FY 2020	FY 2021
JSC ?638									
nent: JSC ?638									
		Accon	nplishments	s/Planned P	rograms Sub	totals	0.396	0.297	1.266
lions)									
	FY 2021	<u>FY 2021</u>	FY 2021					Cost To	
<u>FY 2020</u>	Base	000	<u>Total</u>	FY 2022	FY 2023	FY 2024	4 <u>FY 2025</u>	<u>Complete</u>	Total Cost
6.617	1.827	-	1.827	2.962	2.961	2.99	7 3.996	0.000	27.817
42.622	53.021	-	53.021	47.755	39.808	38.97	8 25.110	0.000	288.398
	<u>Millions)</u> USC ?638 nent: USC ?638 lions) <u>FY 2020</u> 6.617 42.622	A 2021 Army Millions) USC ?638 nent: USC ?638 lions) FY 2020 6.617 Hase 1.827 42.622 53.021	B 2021 Army R-1 Pi PE 06 Develo Millions) USC ?638 USC ?638 Accor Iions) FY 2021 FY 2020 Base 6.617 1.827 42.622 53.021	B 2021 Army R-1 Program Eler PE 0603827A / Sc. Development Millions) USC ?638 Accomplishments USC ?638 FY 2021 FY 2021 FY 2021 FY 2020 Base 0CO Total 1.827 6.617 1.827 - 1.827 42.622 53.021 - 53.021	B 2021 Army R-1 Program Element (Numb PE 0603827A / Soldier System Development Millions) USC ?638 Accomplishments/Planned P USC ?638 FY 2021 FY 2021 FY 2021 FY 2020 Base OCO Total 1.827 6.617 1.827 42.622 53.021 - 53.021	B 2021 Army R-1 Program Element (Number/Name) PE 0603827A / Soldier Systems - Advanced Development Millions) USC ?638 Accomplishments/Planned Programs Sub Millions) Accomplishments/Planned Programs Sub Ions) FY 2021 FY 2021 FY 2021 FY 2021 FY 2020 Base OCO Total FY 2022 FY 2023 6.617 1.827 - 1.827 2.962 2.961 42.622 53.021 - 53.021 47.755 39.808	B 2021 Army R-1 Program Element (Number/Name) PE 0603827A / Soldier Systems - Advanced Development Projec ET8 / F Develo Millions) USC ?638	B 2021 Army Date: Fe R-1 Program Element (Number/Name) PE 0603827A / Soldier Systems - Advanced Development Project (Number/N ET8 / Personnel Ain Development Millions) USC ?638 FY 2019 USC ?638 Accomplishments/Planned Programs Subtotals 0.396 Ions) FY 2021 FY 2021 FY 2021 FY 2020 Base OCO Total FY 2022 FY 2023 FY 2024 FY 2025 6.617 1.827 - 1.827 2.962 2.961 2.997 3.996 42.622 53.021 - 53.021 47.755 39.808 38.978 25.110	B 2021 Army Date: February 2020 R-1 Program Element (Number/Name) Development Project (Number/Name) Development Project (Number/Name) ET8 / Personnel Airdrop System Development Millions) FY 2019 FY 2020 USC ?638 - - - ment: USC ?638 - - - Millions) - - - FY 2020 FY 2021 FY 2021 FY 2020 Ions) - - - - FY 2020 Base 0.6017 0.2021 FY 2021 FY 20221 FY 2022 FY 2022 FY 2023 FY 2024 FY 2025 Cost To Complete 42.622 53.021 - 53.021 47.755 39.808 38.978 25.110 0.000

Remarks

D. Acquisition Strategy

Programs pursue technology maturation and prototype development, culminating in the transition of mature technologies (Technology Readiness Level (TRL) 6-7) to system development and demonstration (SDD).

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	021 Arm	y								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 0603 Develop	gram El 3827A / S oment	ement (N Soldier Sy	umber/N stems - A	ame) Advanced	Project ET8 / P Develoj	t (Numbe Personnel J pment	r/ Name) Airdrop Sy	vstem	
Management Service	es (\$ in M	lillions)		FY	2019	FY 2	020	FY 2 Ba	2021 se	FY 2 OC	2021 CO	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	-	-		0.014		-		-		-	0.000	0.014	-
		Subtotal	-	-		0.014		-		-		-	0.000	0.014	N/A
Product Developme	nt (\$ in M	illions)		FY 2019		FY 2020		FY 2 Ba	2021 se	FY 2 OC	2021 CO	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
Developmental Contracts	C/FFP	TBD : TBD	-	-		0.093		0.727		-		0.727	2.588	3.408	-
Engineering Support	MIPR	CCDC Natick, MA : various	0.460	0.096		0.096		0.100		-		0.100	0.827	1.579	-
		Subtotal	0.460	0.096		0.189		0.827		-		0.827	3.415	4.987	N/A
Support (\$ in Million	s)			FY 2	2019	FY 2	:020	FY 2 Ba	2021 se	FY 2 OC	2021 CO	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	Allot	PM SCIE : Belvoir	0.245	0.100		0.094		0.100		-		0.100	0.811	1.350	-
		Subtotal	0.245	0.100		0.094		0.100		-		0.100	0.811	1.350	N/A
Test and Evaluation	(\$ in Milli	ons)		FY 2	2019	FY 2	:020	FY 2 Ba	2021 se	FY 2 OC	2021 CO	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	TBD : TBD	0.435	0.200		-		0.339		-		0.339	0.782	1.756	-
		Subtotal	0.435	0.200		-		0.339		-		0.339	0.782	1.756	N/A
PE 0603827A Soldier	Systems	- Advanced Develo	oment		UN	ICLASS	SIFIED								

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2							Date: February 2020					
Appropriation/Budget Activity 2040 / 4		R-1 Pro PE 0603 Develop	gram Ele 3827A / S oment	ement (N Soldier Sy	umber/N stems - A	ame) Advanced	Project (Number/Name) d ET8 / Personnel Airdrop System Development					
	019	FY 2021 FY 2021 FY 2020 Base O					2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		0.297		1.266		-		1.266	5.008	8.107	N/A	

Remarks

FY 20				R-' PE De	1 Pro 060 velop	o gran 3827/ omen	n Ele A / S t	e men t oldiei	t (Nu r Sys	imb stem	e r/Nam s - Adv	e) ance	d E1	oject 8 / P	(Nur ersor	nbe nnel	r/Na Aird	me) rop S	ysten	1	
FY 20				R-1 Program Element (Number/Name)PrPE 0603827A / Soldier Systems - AdvancedETDevelopmentDevelopment											Project (Number/Name) ET8 I Personnel Airdrop System Development						
FY 2019 FY 20		2020		FY	202	21		FY	2022		FY	2023		F	Y 20)24		FY	2025		
2 3	3 4	1	2	3	4 1	2	3	4	1	2	3 4	1	2	3	4 1		2	3 4	1	2	3

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020									
ppropriation/Budget Activity)40 / 4	R-1 Program PE 0603827A Development	R-1 Program Element (Number/Name)Project (Number/Name)PE 0603827A / Soldier Systems - AdvancedET8 / Personnel Airdrop SystemDevelopmentDevelopment									
	Schedule Details	5									
		St	art	E	nd						
Events		Quarter	Year	Quarter	Year						
Low Observable (Signature Reduction) Testing		1	2019	4	2019						
Evaluate Component and Subsystem Technologies		1	2019	4	2023						
Static Line T-11 RAAD Development		3	2020	4	2021						
Develop T-11 Light Weight Canopy		1	2022	4	2023						
Develop Smart Universal Static line Hook (SUSH)		3	2021	4	2022						
High Altitude Insertion Enhancements		1	2022	4	2025						

Exhibit R-2A, RDT&E Project Ju		Date: February 2020										
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060382 Developme	am Element 27A / Soldier ent	t (Number /l ⁻ Systems -	Project (N S53 / Cloth	Number/Name) hing And Equipment						
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
S53: Clothing And Equipment	-	1.765	6.466	1.808	-	1.808	2.414	4.474	5.073	8.726	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Funding in this project supports the Army's Cross Functional Teams (CFT) initiatives. This Project supports efforts to evaluate and integrate technologies and representative or prototype systems that help expedite Soldier Clothing and Individual Equipment technology transition from the laboratory to operational use. Efforts focus on proving out commonality across a broad spectrum of users to provide a modular, integrated uniform/clothing system from skin out and head-to-toe. It funds efforts to transition new technologies and domestically available fabrics with Flame Resistant (FR), moisture wicking, insect protection and camouflage technologies, including integration of fabrics appropriate for uniforms and equipment used in all environments such as jungle/tropical and arctic environments. New technologies are indentified to monitor health and improve Soldier survivability, reduce weight, and improve affordability, mobility and comfort in combat and training/administrative environments. Includes integration and interface on the Soldier system. This project will transition capabilities from our Science and Technology partners to increase performance and safety of Soldier clothing and equipment. It will continue to support cross-service initiatives to increase commonality.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Soldier Uniforms and Clothing	1.765	0.472	1.419
Description: Develop superior and sustainable integrated clothing for the Soldier in a rapidly changing global environment.			
FY 2020 Plans: Continue Flame Resistant clothing upgrades. Continue Signature Management evaluation in Camouflage equipment. Continue to evaluate improved lighter weight textiles which incorporate improved vector protection, FR protection, and environmental protection while providing comfort, utility, and functionality. Also, continue to evaluate materials to support extreme cold temperature protection for military free fall parachutists. The S&T transition for environmental cold/wet protection clothing system is planned.			
FY 2021 Plans: Continue Flame Resistant clothing upgrades. Analyze Flame Resistant garment upgrades and review/improve testing protocols. Continue Signature Management efforts in Camouflage Flame Resistant clothing and equipment. Develop enhanced OCIE capabilities for Soldiers operating in cold and extreme cold environments. Continue testing novel materials and processes to improve clothing and equipment for extreme climates. Improve size standardization for all individually sized items.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Just	ification: PB	2021 Army							Date: Fe	bruary 2020	
Appropriation/Budget Activity 2040 / 4	Project S53 / C	eject (Number/Name) 3 I Clothing And Equipment									
B. Accomplishments/Planned Pro		FY 2019	FY 2020	FY 2021							
FY20 \$4M Congressional Add for C requirements changes.	ed										
Title: Individual Equipment		-	1.994	0.389							
Description: Develop and provide s global environment.	superior and s	ustainable ir	ntegrated inc	dividual equi	pment for th	e Soldier in a	rapidly chan	ging			
FY 2020 Plans: Develop process and procedures fo hydration devices items like cold we	5.										
<i>FY 2021 Plans:</i> Analyze Flame Resistant garment u Chemicals/Toxic Industrial Materials current load carriage equipment to a awareness capabilities. Optimize th	ate al ear.										
FY 2020 to FY 2021 Increase/Deci	rease Statem	ent:									
Funding decrease from FY 2020 to	FY 2021 due 1	to anticipate	d changes ir	n requiremer	nts.						
				Accor	nplishment	s/Planned P	rograms Sub	ototals	1.765	2.466	1.808
							FY 2019	FY 202	20		
Congressional Add: Cold Weather	4.0	00									
FY 2020 Plans: Cold Weather Cloth	ning										
Congressional Adds Subtotals -											
C. Other Program Funding Summ	arv (\$ in Milli	ons)									
Line Item	<u>FY 2019</u> 8 152	<u>FY 2020</u> 6 453	FY 2021 Base	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u> 6 717	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	Total Cost
Remarks	0.102	0.400	0.7 17	_	0.717	0.010	0-10	0.031	0.014		-1.009
PE 0603827A: Soldier Systems - Ad	vanced Devel	opment		UNCLAS	SIFIED						

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020				
Appropriation/Budget Activity	Project (N	ct (Number/Name)			
2040 / 4	PE 0603827A I Soldier Systems - Advanced	S53 I Cloth	ning And Equipment		
	Development				

D. Acquisition Strategy

Programs pursue technology maturation and prototype development, culminating in the transition of mature technologies (Technology Readiness Level (TRL) 6-7) to Systems Development and Demonstration. This Project continues to exercise competitively awarded contracts using best value source selection procedures.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	/								Date:	February	2020		
Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name) PE 0603827A <i>I Soldier Systems - Advanced Development</i>					Project (Number/Name) S53 / Clothing And Equipment				
Management Services (\$ in Millions)			FY 2019		FY 2020		FY 2021 Base		FY 2 OC	:021 :O	21 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	TBD	PM SPIE : Ft. Belvoir, VA	15.495	0.285		0.296		0.290		-		0.290	Continuing	Continuing	Continuing	
		Subtotal	15.495	0.285		0.296		0.290		-		0.290	Continuing	Continuing	N/A	
Product Development (\$ in Millions)		FY 2	FY 2019 FY 2020		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	NSRDEC : Natick, MA	16.338	0.327		1.441		0.347		-		0.347	Continuing	Continuing	Continuing	
Development Contracts	C/FFP	Various : Various	34.449	0.355		2.588		0.374		-		0.374	Continuing	Continuing	Continuing	
FY 2019 SBIR /STTR Transfer/FFRDC	TBD	TBD : TBD	-	0.060		-		-		-		-	0.000	0.060	-	
		Subtotal	50.787	0.742		4.029		0.721		-		0.721	Continuing	Continuing	N/A	
Support (\$ in Millions)		FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total]					
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Program OfficeSupport Costs	MIPR	Natick,MA : Natick, MA	8.402	0.302		0.296		0.322		-		0.322	Continuing	Continuing	Continuing	
		Subtotal	8.402	0.302		0.296		0.322		-		0.322	Continuing	Continuing	N/A	
Test and Evaluation (\$ in Millions)		FY 2	2019	FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total]					
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Testing Costs	MIPR	Various : Various	26.914	0.436		1.845		0.475		-		0.475	Continuing	Continuing	Continuing	
Subtotal 26.914			26.914	0.436		1.845		0.475		-		0.475	Continuing	Continuing	N/A	
Exhibit R-3, RDT&E Project Cost Analysis: PB 2	2021 Army	/			Date:	Date: February 2020										
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Appropriation/Budget Activity 2040 / 4	R-1 Program El PE 0603827A / S Development	Number thing An	umber/Name) hing And Equipment													
Prior Years			019	FY 2020	FY 20 Bas	021 FY 2 Se O	2021 I	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract					
Project Cost Totals	6.466	1.808	-		1.808	Continuing	Continuing	N/A								

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A				Date: February	2020				
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 Deve	Program Elemen 603827A / Soldie lopment	umber/Name) hing And Equipm	ent			
Event Name	FY 2019	FY 202	20	FY 2021	FY 2022	F	Y 2023	FY 2024	FY 2025
UNIFORM CLOTHING						ł	· ·	· · ·	
Flame Resistant Clothing Upgrades									
Improve Signature Mgmt (IR) Eval & Camo in Clothing & Eqp									
CW/ECW Clothing Improvements									
CW/ECW Handwear									
INDIVIDUAL EQUIPMENT									
Multi-purpose Personal Hydration System (MPHS) Shelf-life Ext									
Develop TIC/TIM Capability for the Individual Water Treatment E	evice (IWTD)								
Develop Cold Weather Canteen									

chibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Febr	uary 2020				
propriation/Budget Activity 40 / 4	R-1 Program Element (Number/Name)Project (Number/Name)PE 0603827A / Soldier Systems - AdvancedS53 / Clothing And EquipmentDevelopmentS53 / Clothing And Equipment							
Sch	edule Details							
	Start		E	nd				
Events	Quarter	Year	Quarter	Year				
UNIFORM CLOTHING	1	2010	4	2025				
Flame Resistant Clothing Upgrades	1	2012	4	2023				
Improve Signature Mgmt (IR) Eval & Camo in Clothing & Eqpt	2	2012	4	2024				
CW/ECW Clothing Improvements	1	2019	4	2022				
CW/ECW Handwear	1	2020	4	2020				
INDIVIDUAL EQUIPMENT	4	2015	4	2025				
Multi-purpose Personal Hydration System (MPHS) Shelf-life Extension Eva	l 1	2019	4	2024				
Develop TIC/TIM Capability for the Individual Water Treatment Device (IW)	ΓD) 1	2022	4	2022				

Develop Cold Weather Canteen

2020

1

2021

4

Exhibit R-2A, RDT&E Project Ju	Date: Febr	uary 2020										
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060382 Developme	am Elemen 27A / Soldie ent	t (Number/ r Systems -	Project (N S54 / Sma	umber/Name) Il Arms Improvement						
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
S54: Small Arms Improvement	-	7.395	14.555	16.082	-	16.082	19.213	17.423	10.477	10.583	0.000	95.728
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Small Arms Improvement Advanced Component Development and Prototypes (ACD&P) program provides funds to mature, demonstrate, test and evaluate emerging technology from Budget Activity (BA) 3 Program Element (PE) 0603607A Joint Service Small Arms Program (JSSAP) Project 627 Defense Advanced Research Projects Agency (DARPA), Department of Energy National Laboratories, Research Development & Engineering Centers (RDECs) and other domestic and foreign sources for small arms weapon systems and technology. Small arm weapon systems include weapons ranging up to 40 millimeter in caliber. Current and future efforts focus on improvements designed to enhance lethality, target acquisition and tracking, fire control, usability, training effectiveness and reliability of weapons to include ammunition when developing and/or evaluating standard and non-standard weapons. Focus areas include the maturing of technology through testing and evaluation of sub-system or system prototypes which demonstrates light weight materials, wear resistant/protective/anti-reflective coatings, observation/situational awareness improvements, human-systems integration, robotic armament capability, non-lethal capability, and equipment enhancements. Benefits include continuous improvements to small arms weapon systems, fire control equipment, optics, gun barrels, training devices, suppressors, component mounts, weapon mounts, and weapon/ammunition interface. Includes costs associated with efforts for integration and interface of products on Soldiers' head, body and weapons.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: New Weapon Systems	0.800	2.505	2.590
Description: Development of new small arms weapon systems.			
FY 2020 Plans: Externally Powered Weapon (EPW): Continued to support the development of the Capability Development Document (CDD) with Maneuver Center of Excellence and Maneuver Support Center of Excellence. Intended to leverage information gathered from prototype testing and developed a demonstrator to better evaluate and inform the CDD and the various platforms that may include the EPW as their Armament System. Initiated the intelligence/networking and weapons design and functions for a man-in-the-loop, small caliber defensive armaments system on an unmanned ground vehicle including the Warfighter/Robot interface.			
systems.			
FY 2021 Plans: Next Generation Weapons will begin to support technology development for future Next Generation Weapon variants addressing operational force needs for increased lethality, increased probability of hit, increased solider acceptance, decreased signature,			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: F	ebruary 2020			
Appropriation/Budget Activity 2040 / 4	Project (S54 / Sm	Number/N all Arms I	lame) mprovement		
B. Accomplishments/Planned Programs (\$ in Millions)	F	Y 2019	FY 2020	FY 2021	
reduced recoil, reduced soldier aim error, and reduced engagement NGSW-R and NGSW-AR or new weapon platforms to fulfill other ro	time. New weapons may be variants or enhancements of les such as machine guns, sniper rifles, and others.	of the			
EPW will complete maturation and upgrade of prototype system bas integration of intelligence/networking/remote operation capabilities. Capabilities Development and Integration Directorate (M-CDID and Capability Development Document.	sed on test and experimentation results. Will continue wit Will continue to work with Maneuver and Maneuver Supp MS-CDID) Futures and Concepts Centers regarding the	h port			
New Weapons Systems Evaluations and Assessments: Will continuand integration of new weapons to include various new weapon sys	ue to perform initial and follow-on evaluations, assessmer tem platforms.	its			
FY 2020 to FY 2021 Increase/Decrease Statement: Increase in funding required for development and testing of New We	eapon Systems.				
Title: Small Arms Weapon Systems Enhancements			1.340	7.650	8.645
Description: Enhancements and development of small arms weapont	on systems.				
FY 2020 Plans: Current and Legacy Weapon Improvements assessed and evaluate legacy weapon systems.	d selected capabilities and improvements for all current a	nd			
Solid State Active Denial System worked to complete maturation of Document and provided input into programmatic documents as nec	design, continued to monitor status of Capability Develop essary.	ment			
Individual Non-Lethal System worked to complete maturation of des support of Milestone B. Previously funded in Fiscal Year (FY) 2017	ign and got it ready for prove out test at Government facil	ity in			
Non-Standard Weapons Assessments continued to conduct baselin capability analysis of unique weapon characteristics. Continued to u Non-Developmental Item solutions for pending requirements as wel of Regionally Aligned Forces and established a sustainment strateg Regionally Aligned Forces training mission. Continued to conduct m	e testing of commercial weapon systems and perform tilize test information to conduct trade off assessments of I as established safety parameters for the training missior y for long term support of weapons procured to support th tarket research of commercially available weapon system	i ie S.			
		I	I	I	

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: F	ebruary 2020)		
Appropriation/Budget Activity 2040 / 4	Project (N S54 / Sma	lumber/l hll Arms I	Name) mprovement		
B. Accomplishments/Planned Programs (\$ in Millions)	F۱	2019	FY 2020	FY 2021	
Small Business Innovative Research Enhancements continued future efforts to lethality, target acquisition and tracking, fire control, training effectiveness and	o focus on improvements designed to enhance reliability of weapons.				
FY 2021 Plans: Next Generation Defeat will design, develop, and prototype fabrication of adva employable system that will be capable of on-target effects against multiple typ are exposed, thin skin vehicles, unmanned aerial systems)	anced technologies to incorporate into Soldier pes of targets (i.e. targets behind cover, targets	that			
Next Generation Weapons/Enhancements will begin to support technology devariants addressing operational force needs for increased lethality, increased decreased signature, reduced recoil, reduced soldier aim error, and reduced enhancements of the Next Generation Squad Weapon Rifle (NGSW-R) and N new weapon platforms to fulfill other roles such as machine guns, sniper rifles,	velopment for future Next Generation Weapon probability of hit, increased solider acceptance, engagement time. New weapons may be variar ext Generation Squad Automatic Rifle (NGSAR , and others.	ts or) or			
Non-Standard Weapons Assessments will continue to conduct baseline testing capability analysis of unique weapon characteristics. Continue to utilize test in Non-Developmental Item solutions for pending requirements as well as establin Regionally Aligned Forces and other non Department of Defense (DOD) custor strategy for long term support of weapons procured to support the Regionally assessments of limited distribution materiel systems considered for Table of O Table of Allowances (CTA) approvals. Continue to conduct market research of	g of commercial weapon systems and perform formation to conduct trade off assessments of ish safety parameters for the training mission of omers. Will continue to establish a sustainment Aligned Forces training mission. Will conduct s Organization and Equipment (TOE) and Commo f commercially available weapon systems.	afety n			
Protective Weapons Coatings/Low Plasticity Burnishing will continue to develo of super hydrophobic and other coatings in support of preserving barrel and bo readiness. Continue to assess and evaluate current manufacturing process sto technology into weapon Original Equipment Manufacturer manufacturing process	op manufacturing technology to support product olt life of small arms weapons while improving udies and assessments to adapt the coating esses.	on			
Solid State Active Denial System will continue to monitor status of Capability D programmatic documents as necessary. Will continue work to complete mature	Development Document and provide input into c ation of design.	ther			
Individual Non-Lethal System will mature and complete prototype design for in concept and design test efforts at Government facility in support of Milestone I	itegration into a full system. Will prepare for pro 3. New Start in FY 2020.	of of			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date:	February 2020								
Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 4 PE 0603827A / Soldier Systems - Advanced S54 / Small Arms Improvement Development Development S54 / Small Arms Improvement											
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021								
Armaments for Robots will continue intelligence/networking and weapond defensive armaments system on an unmanned ground vehicle including	ons design and functions for a man-in-the-loop, small ca ig the Warfighter/Robot interface.	liber									
Recoil Reduction Mechanisms will continue to assess and evaluate sel fabricated and tested for both individual and crew served weapons.	lected Recoil Reduction Mechanisms prototypes to be										
Current and Legacy Weapon Improvements will continue to assess and current and legacy weapon systems.	d evaluate selected capabilities and improvements for a	all									
FY 2020 to FY 2021 Increase/Decrease Statement: Increase in funds required to reduce technology risk and to determine to Next Generation Weapons technology development phase.	the appropriate set of technologies required to complete	9									
Title: Ammunition		0.130	0.100	-							
Description: Small arms ammunition improvement.											
FY 2020 Plans: Ammunition Upgrades: Continued to evaluate the effect of new ammu	nition on small arms weapon systems.										
FY 2020 to FY 2021 Increase/Decrease Statement: Decrease in funding due to a lack of Ammo requirements.											
Title: Combat Optics		0.137	0.100	0.100							
Description: Improvement of small arms combat optics.											
FY 2020 Plans: FY 2020 New Start: Next Generation Optics: Integrated current and er variable magnification spotting scope and into binoculars.	merging target acquisition component technologies into	a									
FY 2021 Plans: Next Generation Optics: Will continue to integrate current and emergin and variable magnification spotting scopes. Will continue to evaluate st for inclusion in future combat optic products.	g target acquisition component technologies into binoco tate of the art advances in optical component technolog	ulars ies									
Title: Fire Control		4.72	4.000	4.000							
Description: Small arms fire control.											

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)ProjectPE 0603827A I Soldier Systems - AdvancedS54DevelopmentDevelopment	ect (Number/N Small Arms II	lame) mprovement	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
FY 2020 Plans: Next Generation Fire Control Technology Enhancements continued to sup Squad Weapons, and specifically address decrease soldier aim error, dec Prototype demonstrations had application in individual and crew served we	port technology integration with Next Generation rease engagement time and increase probability of hit. eapons to enhance and upgrade Fire Control.			
FY 2021 Plans: Next Generation Fire Control Technology Enhancements will continue to se Weapons addressing soldier aim error, engagement time, probability of hit acceptance. Iterative prototyping will be utilized to develop component tect Generation Squad Weapon. Technology may include enhanced camera be detection, increased networked lethality, reduced signature, increased use ammunition, and fire control technologies that will increase the lethality of Small Arms Fire Control Enhancements will continue research test and ev concept devices, and other optical designs for prototypes that incorporate integration of sensor input and communication with ammunition for all small	upport technology integration with Next Generation , situational awareness, lethality, and soldier hnologies to support future variants of the Next ased technology, target tracking, automatic target rr acceptance, along with other emerging weapon, the next generation squad weapons. aluation efforts on laser based wind sensors, proof-of- fire control sensors and ballistic solver software and Il arms weapon platforms.			
Title: Research and Analysis		0.267	0.200	0.747
Description: Research and analysis of small arms.				
FY 2020 Plans: Continued to initiate Market Research and Benefit Analysis of 360 degree kinetic weapons, low flying drone engagement, and other small arms rese	situational awareness, active stabilization, advanced arch.			
FY 2021 Plans: Plan to continue Market Research and Benefit Analysis of 360 degree situ weapons, low flying drone engagement, and other small arms research to armaments.	ational awareness, active stabilization, advanced kinetic include new technologies in emerging robotic and aerial			
FY 2020 to FY 2021 Increase/Decrease Statement:				
Increase in funds required to explore emerging technologies in robotic and	aerial armaments.			
	Accomplishments/Planned Programs Subtotals	7.395	14.555	16.082

Exhibit R-2A, RDT&E Project Justi	Date: Feb	oruary 2020									
Appropriation/Budget Activity 2040 / 4				R-1 P PE 06 <i>Devel</i>	rogram Eler 03827A / Sc opment	nent (Numb Idier System	Number/Name) nall Arms Improvement				
C. Other Program Funding Summa	ary (\$ in Milli	ons <u>)</u>									
			<u>FY 2021</u>	<u>FY 2021</u>	FY 2021					Cost To	
Line Item	<u>FY 2019</u>	<u>FY 2020</u>	Base	000	Total	<u>FY 2022</u>	FY 2023	FY 2024	FY 2025	Complete	Total Cost
• EW4: Crew Served Weapons	25.058	4.089	4.263	-	4.263	4.285	4.423	4.525	4.498	0.000	51.141
Engineering Development											
• FF2: Small Arms Fire Control	4.094	14.700	10.153	-	10.153	11.244	7.993	9.991	9.992	0.000	68.167
• FI2: Lightweight 30mm Cannon	-	1.384	0.000	-	0.000	-	-	-	-	0.000	1.384
 FM4: Next Generation 	-	33.080	44.837	-	44.837	13.767	15.456	16.045	10.991	0.000	134.176
Squad Weapons											
S63: Individual Weapons	12.454	2.697	4.374	-	4.374	4.214	4.280	4.270	4.216	0.000	36.505
Engineering Development											
• FL4: Small Caliber Ammo	-	18.180	30.600	-	30.600	28.723	24.976	11.739	11.858	0.000	126.076
for Next Gen Squad Weapons											
• 627: Jt Svc Sa Prog (JSSAP)	5.708	-	0.000	-	0.000	-	-	-	-	0.000	5.708
• E06002: NEXT GENERATION	-	-	11.988	-	11.988	20.519	60.880	187.813	189.692	0.000	470.892
COMBAT ROUND											

Remarks

In support of Small Arms Initial Capability and Capability Development Requirements, advanced technology of small arms weapon systems is transitioned from Joint Service Small Arms Program (JSSAP), Project 627, Program Element 0603607A, (Budget Activity 3) to Small Arms Improvement, Project S54, Program Element 0603827A, (Budget Activity 4). After the technology is demonstrated and/or validated, the program transitions to Infantry Support Weapons, Program Element 0604601A, (Budget Activity 5) for engineering and manufacturing development.

D. Acquisition Strategy

Primary strategy is to study, develop, demonstrate and evaluate emerging technologies that ultimately lead to modernizing, enhancing and/or improving the small arms inventory.

(Name) Improvem Cost To Complete Continuing (Continuing (ment Total Cost Continuing Continuing	Target Value of Contract Continuin
Cost To Complete Continuing (Continuing (Continuing (Total Cost Continuing Continuing	Target Value of Contract Continuin
Cost To Complete Continuing (Continuing (Continuing (Total Cost Continuing Continuing	Target Value of Contract Continuin Continuin
Continuing (Continuing (Continuing (Continuing Continuing	Continuin Continuin
Continuing (Continuing Continuing	Continuin
Continuing (Continuing	N//
Cost To Complete	Total Cost	Target Value of Contract
Continuing (Continuin	Continuin
Continuing (Continuin	N//
Cost To Complete	Total Cost	Target Value of Contract
Continuing (Continuine	Continuin
Continuing (Continuing	N/A
	continuing continuing Cost To complete continuing	Continuing Continuing Continuing Continuing Cost To Cost To Complete Cost Continuing Continuing Continuing Continuing

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Army	y								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Program Element (Number/Name)Project (NPE 0603827A / Soldier Systems - AdvancedS54 / SmallDevelopmentS54 / Small						(Number mall Arms	r/ Name) s Improvei	ment	
Test and Evaluation	(\$ in Milli	ons)		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
Developmental Testing	MIPR	Army Test and Evaluation Centers, : Multiple	15.008	1.689	Mar 2019	1.970	Mar 2020	2.777	Mar 2021	-		2.777	Continuing	Continuing	Continuing
		Subtotal	15.008	1.689		1.970		2.777		-		2.777	Continuing	Continuing	N/A
		Prior Years	FY 2	2019	9 FY 2020		FY 2021 Base		FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
		Project Cost Totals	82.686	7.395		14.555		16.082		-		16.082	Continuing	Continuing	N/A

Remarks

ibit R-4, RDT&E Schedule Profile: PB 2021 Army													Date: February 2020															
Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name)ProjectPE 0603827A / Soldier Systems - AdvancedS54 / SoldierDevelopmentS54 / Soldier										ject (Number/Name) I Small Arms Improvement											
Event Name		F١	(20 1	19		FY	202	0		FY	202 [,]	1		FY	202	2		FY	202	3		FY	202	24		FY	2025	5
	1	2	3	4	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 WEAPON SYSTEMS																												
Next Generation Automatic-Rifle																												
Next Generation Squad Weapon-Rifle																												
Externally Powered Weapon (EPW)																												
New Weapon Systems Evaluations and Assessments																												
SMALL ARMS WEAPON SYSTEMS ENHANCEMENTS																												
Next Generation Defeat																												
Current and Legacy Weapon Improvements																												
Individual Non-Lethal System																												
Non-Standard Weapon Assessments																												
Small Business Innovative Research																												
Protective Weapons Coatings (Low Plasticity Burnishing)																												
Weapage Upgrades and Association																												
weapons opgrates and Accessories																												

Exhibit R-4, RDT&E Schedule Profile: PB 2021 /	Army							Date: February	2020	
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 <i>Deve</i>	lumber/Name) all Arms Improver	nent					
Event Name	FY 2019	FY 20	20	FY 2021	FY 2022	F	FY 2023	FY 2024	FY	2025
	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1	2 3 4	1 2 3 4	1 2	3 4
AMMUNITION										
Ammunition Upgrades										
COMBAT OPTICS										
Next Generation Optics										
Optics Upgrades										
FIRE CONTROL										
Next Generation Fire Control Technology Enhancements										
Next Generation Fire Control										
Small Arms Fire Control Enhancements	Formerly Small Arms Fire	Control -Precision/	Enhance	ements						
Small Arms Fire Control Upgrades										
RESEARCH AND ANALYSIS										
Research and Analysis of Small Arms										
						<u> </u>				

khibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020						
ppropriation/Budget Activity)40 / 4	R-1 Program Element (Number PE 0603827A <i>I Soldier System</i> <i>Development</i>	e r/Name) s - Advanced	Project (Number/Name) ed S54 I Small Arms Improvement					
	Schedule Details							
	S	tart	E	nd				
Events	Quarter	Year	Quarter	Year				
NEW WEAPON SYSTEMS	1	2008	4	2025				
Next Generation Automatic-Rifle	1	2014	4	2020				
Next Generation Squad Weapon-Rifle	2	2019	4	2020				
Externally Powered Weapon (EPW)	1	2015	4	2022				
New Weapon Systems Evaluations and Assessments	1	2017	4	2025				
SMALL ARMS WEAPON SYSTEMS ENHANCEMENTS	1	2008	4	2025				
Next Generation Defeat	1	2021	4	2023				
Current and Legacy Weapon Improvements	1	2020	4	2025				
Individual Non-Lethal System	1	2021	4	2022				
Non-Standard Weapon Assessments	1	2020	4	2025				
Small Business Innovative Research	1	2015	4	2025				
Protective Weapons Coatings (Low Plasticity Burnishing)	1	2016	4	2022				
Weapons Upgrades and Accessories	1	2010	4	2025				
AMMUNITION	1	2008	4	2020				
Ammunition Upgrades	1	2016	4	2020				
COMBAT OPTICS	1	2008	4	2025				
Next Generation Optics	1	2020	4	2024				
Optics Upgrades	1	2016	4	2019				
FIRE CONTROL	1	2008	4	2025				
Next Generation Fire Control Technology Enhancements	1	2019	4	2025				
Next Generation Fire Control	1	2017	3	2019				
Small Arms Fire Control Enhancements	1	2017	4	2022				

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Exh	nibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febr	uary 2020	
Apr 204	oropriation/Budget Activity 0 / 4	Element (Numbe I Soldier Systems	r/Name) Pro - Advanced S54	ject (Number/Nan I Small Arms Impr	ie) rovement		
		·	St	art	E	nd	
	Events		Quarter	Year	Quarter	Year	
	Small Arms Fire Control Upgrades		1	2008	4	2019	
	RESEARCH AND ANALYSIS		1	2012	4	2025	
	Research and Analysis of Small Arms		1	2015	4	2025	

Exhibit R-2A, RDT&E Project J	ustification	: PB 2021 A	Army							Date: Fel	bruary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 06038 Developm	r am Elemer 27A / Soldie ent	nt (Number) er Systems -	Name) Advanced	Project (N VS4 / Sola	umber/Na lier Protect	a me) tive Equipme	ent
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
VS4: Soldier Protective Equipment	-	20.828	2.836	4.441	-	4.441	4.905	6.482	8.143	8.14	3 Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Funding in this project supports representative or prototype syst will transition capabilities from o support cross-service initiatives	the Army's (ems that hel ur Science a to increase	Cross Funct p expedite f and Technol commonality	ional Team Personal Pr ogy partner y.	s' (CFT) init otective Eq s to increas	iatives. Th uipment (Pl se performa	is Project su PE) technolo Ince and saf	upports effor ogy transitic fety of Soldi	ts to evaluand from the left of the left o	ate integrate laboratory to and protecti	ed technolo o operation ve equipm	ogies and nal use. This lent. It will c	s project ontinue to
B. Accomplishments/Planned	Programs (\$ in Million	<u>s)</u>						FY	2019	FY 2020	FY 2021
Description: Effort to increase N life cycle aspects of Personal Pr	Warfighter su otective Equ	urvivability a iipment (PPI	nd mobility E).	by optimizi	ng Soldier p	protection w	hile effective	ely managir	ng all	20.020	2.000	4.441
FY 2020 Plans: This project executing at a reduct across the PPE portfolio: Torso a (IHPS); and Transition Combat B improved performance and man Office will evaluate upgrades an as appropriate. Continue efforts protective systems at the subsyst existing systems and emerging r	ced level of e and Extremit Eye Protectio ufacturing/ to d inform stal to character stem/compon requirements	effort from F ty Protectior on (TCEP) to esting proce keholders of ize and incr nent level. C s.	Y19, will co n (TEP); Vita o support S ss improve new opera ease durab continue the	ntinue Tech al Torso Pro PS requirer ments. As r tional capal lity, shelf lif developme	nnology/Ma otection (VT nents for lig new materia bilities and fe, and func ent of impro	turation and (P); Integrat ghter-weight als are ready then incorpo then incorpo tional service oved measure	Risk Reduced Head Pr ballistic ma the Productor the Produc	ction efforts otection System terials with ct Manager nto SPS de sting persor resses for	stem nent signs nal			
FY 2021 Plans: Project will continue Technology (TEP); Vital Torso Protection (V ⁻ support SPS requirements for lig improvements. If new materials operational capabilities and then	/Maturation TP); Integrat ghter-weight are ready, th i incorporate	and Risk Re ed Head Pro ballistic mat he Product M them into S	eduction effe otection Sys erials with i Managemen SPS designs	orts across stem (IHPS) mproved po t Office will as approp	the PPE pc); and Milita erformance evaluate u riate. Conti	ortfolio: Tors ary Combat and manufa pgrades and nue efforts t	o and Extre Eye Protect acturing/ tes d inform stal o character	mity Protec ion (MCEP) ting proces keholders o ize and incr	tion to s f new ease			

Exhibit R-2A, RDT&E Project Justif	ication: PB	2021 Army							Date: Fe	bruary 2020	
Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 4 PE 0603827A / Soldier Systems - Advanced VS4 / Soldier Protect										ime) tive Equipme	ent
B. Accomplishments/Planned Prog	rams (\$ in N	<u>/lillions)</u>						F	Y 2019	FY 2020	FY 2021
durability, shelf life, and functional set the development of improved measur	rvice life of e ement proce	xisting perso esses for exi	onal protecti sting system	ve systems a is and emerg	at the subsys ging requiren	tem/compor nents.	nent level. Co	ntinue			
FY 2020 to FY 2021 Increase/Decre Funding change in Soldier Protective result in a increase level of effort to a	ase Statem Equipment ddress emer	e nt: portfolio is di ging threats	ue to anticip	ated requirer	ment change	es in FY 2020) and FY 202	1 that			
				Accon	nplishments	s/Planned P	rograms Sub	ototals	20.828	2.836	4.441
C. Other Program Funding Summa	ry (\$ in Milli	ons <u>)</u>									
			<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>					Cost To	
Line Item	<u>FY 2019</u>	FY 2020	Base	000	<u>Total</u>	<u>FY 2022</u>	FY 2023	FY 2024	<u>FY 2025</u>	Complete	Total Cost
• VS5: Soldier Protective Equipment	4.667	6.627	8.319	-	8.319	9.656	9.480	8.498	9.063	0.000	56.310
• 121017: Central Issue	-	-	-	-	-	-	-	-	-		
Facilities/Initial Issue:											
Organization/Clothing/Equipment											
<u>Remarks</u>											

D. Acquisition Strategy

Programs pursue technology transition from science and technology, maturation, and prototype development, culminating in the transition of mature technologies (Technology Readiness Levels (TRL) 6-7) to Engineering and Manufacturing Development. This Project continues to exercise competitively awarded contracts using best value source selection procedures where applicable.

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2021 Army	y								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1		R-1 Pro PE 0603 Develop	gram El 3827A / S oment	ement (N Soldier Sy	umber/N stems - A	ame) Idvanced	Project VS4 / S	oldier Pro	r/ Name) itective Ed	quipment			
Management Service	es (\$ in M	lillions)		FY 2	2019	FY 2	:020	FY 2 Ba	2021 se	FY 2 OC	021 :O	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	Allot	PM SPIE Various : Various	2.212	0.934		0.400		0.782		-		0.782	Continuing	Continuing	Continuing
		Subtotal	2.212	0.934		0.400		0.782		-		0.782	Continuing	Continuing	N/A
Product Developmer	nt (\$ in M	illions)		FY 2	2019	FY 2021 FY 202 FY 2020 Base OCO		021 :O	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
Dev/Sys Engineering Spt	MIPR	Various : Various	8.502	0.400		0.750		0.500		-		0.500	Continuing	Continuing	Continuing
Dev/Integ Contracts	TBD	Various : Various	60.168	17.609		1.000		2.509		-		2.509	Continuing	Continuing	Continuing
FY 2019 FFRDC / SBIR / STTR	TBD	TBD : TBD	-	0.308		-		-		-		-	0.000	0.308	-
		Subtotal	68.670	18.317		1.750		3.009		-		3.009	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY 2	2019	FY 2	:020	FY 2 Ba	2021 se	FY 2 OC	021 :O	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
Misc Support Costs	MIPR	Various : Various	4.757	0.664		0.200		-		-		-	Continuing	Continuing	Continuing
		Subtotal	4.757	0.664		0.200		-		-		-	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ions)		FY 2	2019	FY 2	:020	FY 2 Ba	2021 se	FY 2 OC	021 :O	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
Ballistic/Blast/Nonballistic Testing	MIPR	Various : Various	17.782	0.913		0.486		0.650		-		0.650	Continuing	Continuing	Continuing
		Subtotal	17.782	0.913		0.486		0.650		-		0.650	Continuing	Continuing	N/A
DE 0602927A: Soldier	Sustama	Advanced Devale	nmont												

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2		Date: February 2020										
Appropriation/Budget Activity 2040 / 4		R-1 Program Ele PE 0603827A / S Development	Project VS4 / So	(Number oldier Pro	Number/Name) dier Protective Equipment							
Prior Years FY 2019				FY 2020	FY 2 Ba	2021 se	FY 2 OC	021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	93.421	20.828		2.836	4.441		-		4.441	Continuing	Continuing	N/A

Remarks

bit R-4, RDT&E Schedule Profile: PB 2021 Army													Date: February 2020					
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)ProjectPE 0603827A / Soldier Systems - AdvancedVS4 / SoldierDevelopmentVS4 / Soldier										ame) ctive Eq	uipme	ent				
Event Name	FY 2019	FY 20	20	FY	2021	F	Y 2022	F	TY 202	3		FY 2	2024		FY 20	025		
Event Name	1 2 3 4	1 2 3	4	1 2	3 4	1 :	2 3 4	1	2 3	4	1	2	3 4	1	2	3 4		
SPS Technology Upgrade Insertion																		
TCEP Authorized Protective Eyewear (APEL) Update	A																	
VTP LRIP Production																		
VTP FRP Decision		2																
VTP Technology Upgrade Insertion																		
TEP Technology Upgrade Insertion																		
Helmet Technology Upgrade Insertion																		
Next Gen IHPS Contract Award				3														
Next Gen IHPS Deliveries																		
MCEP Improvement																		

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Feb	ruary 2020				
ppropriation/Budget Activity 040 / 4	R-1 Program Element (Number/Name) Project (Number/Name) PE 0603827A / Soldier Systems - Advanced VS4 / Soldier Protective E Development Output to the Development							
	Schedule Details							
	S	tart	E	nd				
Events	Quarter	Year	Quarter	Year				
SPS Technology Upgrade Insertion	1	2017	4	2023				
TCEP Authorized Protective Eyewear (APEL) Update	3	2019	3	2019				
VTP LRIP Production	1	2017	1	2021				
VTP FRP Decision	1	2020	1	2020				
VTP Technology Upgrade Insertion	1	2020	4	2023				
TEP Technology Upgrade Insertion	1	2020	4	2023				
Helmet Technology Upgrade Insertion	1	2020	4	2021				
Next Gen IHPS Contract Award	1	2021	1	2021				
Next Gen IHPS Deliveries	4	2021	4	2025				

MCEP Improvement

2021

1

4

2022

Exhibit R-2, RDT&E Budget Iten	nibit R-2, RDT&E Budget Item Justification: PB 2021 Army												
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACD	ation, Army 0&P)	I BA 4: Adv	anced	R-1 Progr a PE 060401	am Elemen 17A / Roboti	t (Number/ ics Develop						
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	-	70.745	84.381	121.207	-	121.207	144.629	146.620	146.708	146.728	0.000	861.018	
CF4: Robotic Combat Vehicle (RCV) NGCV-CFT	-	0.000	78.559	114.889	-	114.889	139.867	141.868	141.868	141.878	0.000	758.929	
FD2: Soldier Robotics Systems	-	2.056	2.771	3.258	-	3.258	1.753	1.791	1.834	1.836	0.000	15.299	
FD3: Battery Modernization & Interface Standardization	-	0.821	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.821	
FD9: Robotics Systems	-	67.868	3.051	3.060	-	3.060	3.009	2.961	3.006	3.014	0.000	85.969	

A. Mission Description and Budget Item Justification

The Robotic Combat Vehicle (RCV) Prototyping effort will produce unmanned combat vehicle prototypes with the purpose of providing vehicles that Soldiers will use to develop new Concepts of Operations (CONOPS) and new requirements for unmanned combat vehicles to support Army Modernization priorities. RCV efforts will be executed in three (3) phases focused on increasing the complexity of RCV soldier maneuvers and expanding prototype platform capability. These efforts provide the basis for the Army to make the decision to move forward with a Robotic Combat Vehicle program transitioning from Technology Demonstrations to a Program of Record through Modeling and Simulation (M&S) development, initial prototype testing and iterative Soldier evaluations. This will stress the autonomy systems developed within the Science and Technology (S&T) base, assist the Next Generation Combat Vehicles Cross Functional Team (NGCV CFT) with refining RCV requirements, and develop the CONOPS and Tactics, Techniques and Procedures (TTPs) for Manned / Unmanned Teaming (MUM-T) in combat relevant missions.

Soldier Robotics Systems for Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. Joint Capabilites Integration and Development System, Department Directed, etc.) and by maturing/transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives/Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation/transition from S&T projects, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for robotic systems that are transported by vehicle and maneuver under their own power.

The Battery Modernization & Interface Standardization (BMIS) program was established to help bring greater power efficiency and effectiveness to the dismounted Soldier and reduce the proliferation of proprietary batteries across the Army. BMIS will develop the Army Standard Family of Batteries (SFoB), a central acquisition management authority, and reduce 38 Communications-Electronics (C-E) battery types, currently in use, to just 3. Battery standardization and policy enforcement will support Operational Readiness at a reduced cost to the Army while maintaining configuration management, life cycle support, safety standards, and technological upgrades.

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 I BA 4: Advanced	PE 0604017A I Robotics Development	
Component Development & Prototypes (ACD&P)		

Robotics Systems for Applique and Large Unmanned Ground Systems (ALUGS) RD improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, etc.) and by maturing/transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives/Letter of Sufficiency determinations, market research, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation/transition from S&T projects, MDD, and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for large robotic systems that are transported by vehicle, maneuver under their own power, or are installed as robotic applique kits. Research Development Technology Evaluation (RDTE) funds enable support to capability development of emerging systems currently including Tactical Wheeled Vehicle - Leader Follower (TWV-LF), Assault Breacher Vehicle (ABV), Dismounted Engineer Mobility System (DEMS), and Modular Mission Payloads (MMP). Funds prepare these capabilities for entrance into the Defense Acquisition System (i.e. Milestone decision). RDTE Product Manager Applique and Large Unmanned Ground Systems funding supports Leader Follower and ABV program transitions from Technology Demonstrations to Program of Record through Modeling and Simulation (M&S) development and initial prototype testing. This will stress the autonomy systems and ultimately reduce Program of Record testing requirements, technical risks, and costs through studies and validated simulations. Funding also supports the exploration and development of Expedient Leader Follower (ExLF) Applique on additional systems (Heavy Expanded Mobility Tactical Truck (HEMTT), Family of Medium Tactical Vehicles (FMTV), and 915 truck fleets) beyond the Palletized Load System (PLS) and applique kits on existing Tactical Wheeled Vehicles.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	74.368	115.222	105.332	-	105.332
Current President's Budget	70.745	84.381	121.207	-	121.207
Total Adjustments	-3.623	-30.841	15.875	-	15.875
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-30.841			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-3.623	-			
 SBIR/STTR Transfer 	-	-			
 Adjustments to Budget Years 	-	-	15.875	-	15.875

Change Summary Explanation

FY 2021 increase of \$15.992 million aligns program requirements with Army modernization priorities for Project CF4 Robotic Combat Vehicle (RCV) NGCV-CFT.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army											Date: February 2020		
Appropriation/Budget Activity R-1 Program Element (Number/Name) 2040 / 4 PE 0604017A / Robotics Development						Project (Number/Name) CF4 I Robotic Combat Vehicle (RCV) NGCV-CFT							
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	
CF4: Robotic Combat Vehicle (RCV) NGCV-CFT	-	0.000	78.559	114.889	-	114.889	139.867	141.868	141.868	141.878	0.000	758.929	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

The Robotic Combat Vehicle (RCV) Prototyping effort will produce unmanned combat vehicle prototypes with the purpose of providing vehicles that Soldiers will use to develop new Concepts of Operations (CONOPS) and new requirements for unmanned combat vehicles to support Army Modernization priorities. RCV efforts will be executed in three (3) phases focused on increasing the complexity of RCV soldier maneuvers and expanding prototype platform capability. These efforts provide the basis for the Army to make the decision to move forward with a Robotic Combat Vehicle program transitioning from Technology Demonstrations to a Program of Record through Modeling and Simulation (M&S) development, initial prototype testing and iterative Soldier evaluations. This will stress the autonomy systems developed within the Science and Technology (S&T) base, assist the Next Generation Combat Vehicles Cross Functional Team (NGCV CFT) with refining RCV requirements, and develop the CONOPS and Tactics, Techniques and Procedures (TTPs) for Manned / Unmanned Teaming (MUM-T) in combat relevant missions.

In order to accelerate user involvement with RCV platform capabilities, an RCV Prototyping effort will be executed through a three (3) phase activity. The RCV surrogate platform build (Phase 1) was initiated in Fiscal Year (FY) 2019 under 0604017A Robotics Development, Project FD9 Robotics Systems and will conclude in this project with test and demonstration. This project will finalize Phase 1's rapid prototype build of surrogate RCV platforms using existing robotized vehicles and conduct Soldier evaluations at the platoon level (4 RCVs) through MUM-T evaluations. In order to conduct larger scale MUM-T maneuvers and to continue to advance the autonomous performance of the robotic platforms, two additional platoons of RCVs will be built leveraging existing contractor unmanned platforms for a total of a company set (12) RCVs. The company of RCVs (Phase 2) will be used for a second round of Soldier experimentation building off of the platoon exercises and providing additional refinement of CONOPs/TTPs.

The RCV Phase 3 prototyping will build off lessons learned in Phases 1 and 2 and develop and produce innovative, unmanned platforms that investigate different approaches to solving challenges and building on opportunities in Phases 1 and 2 to include looking at different weight class RCV platform and new modular mission payloads for RCV platforms. The intent is to award a minimum of two contracts to design and build up to a company set (12) RCV platforms for user evaluation and experimentation starting at the end of FY 2024. The RCV platforms will incorporate mature technology capabilities transitioned from S&T as they become available to include the latest autonomous mobility capability, improved user control interfaces and advanced sensing and aided target recognition. The Phase 3 RCV platform requirements will be informed by the initial platoon and company experimentation (Phase 1 and 2) and Soldier feedback.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Robotic Combat Vehicle (RCV) ? Prototype Platforms	-	65.534	86.227
Description: RCV ? Prototype Platforms effort will produce unmanned combat vehicle prototypes with the purpose of creating an experimental unit that Soldiers will use to create new CONOPS and new requirements for unmanned combat vehicles to			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020)
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A <i>I Robotics Development</i>	Projec CF4 / / NGCV	RCV)		
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2019	FY 2020	FY 2021
support Army Modernization priorities. Several variants of prototype adapt existing platforms into surrogate RCVs for early experimenta learned from the surrogate vehicle builds, platforms optimized to be that unmanned platforms can offer such as reduced platform size a going through Army Test & Evaluation Center (ATEC) safety releas experimentation.	es will be created, starting first with surrogate platforms we tion in several different weight classes. Based off of less e RCVs will be built which maximize the capability advant and weight. The platforms will be built with the purpose of se and ultimately for Soldier evaluation through iterative U	/hich ions ages Jser			
<i>FY 2020 Plans:</i> In FY 2020, contracts for surrogate RCVs (Phase 2) using existing of requirements generated from a platform evaluation funded under FB7 Robotics Enhancement Program (REP). Surrogate RCV platfor roles. Direct fire, missile systems and advanced sensors were inte Remote mobility functions were improved and autonomy sensor su ATEC safety assessment in FY 2021. These platforms were comb Development, Project FD9 Robotics Systems in FY 2019 for compa 2021.	platforms were awarded to up to two (2) contractors base r Program Element (PE) 0605053A Ground Robotics, Pro orms focused on reconnaissance and decisive lethality m grated on to the platforms designed for remote operation ite were integrated to ensure safety critical operation for ined with M113 surrogates built under PE 0604017A Rob any level RCV Surrogate Experimentation scheduled in F	ed off oject iission potics 'Y			
<i>FY 2021 Plans:</i> Phase 2 light and medium RCV prototype integration of autonomy s for test and evaluation will be completed. This will transition update Phase 1 and Phase 2 surrogate systems for Phase 2 experimentation prototypes will begin and as well as the fabrication and purchase of energy storage, sensors, and lethality systems. Phase 3 prototype designed for remote operation and the integration of direct fire, mis for modular mission packages including obscuration, electronic war will be matured and integrated.	software, sensors, and lethality systems, delivering proto ed aided-target-recognition and navigation algorithms to ion. The concept and detailed design of the Phase 3 RCV f long-lead components and sub-systems including powe platforms will focus on decisive lethality mission roles, wi sile systems and advanced sensors. Remote control soft rfare, chemical-biological and other reconnaissance sens	types / rtrain, II be ware sors			
FY 2020 to FY 2021 Increase/Decrease Statement: In FY 2021, prototyping activities are primarily in support of Phase 3 requirements in areas of lethality, survivability, and operational mot and prototyping costs in comparison to Phase 2 platforms primarily	3 prototypes, with increased operational performance bility driving increases in platform non-recurring engineer funded in FY 2020.	ing			
Title: Robotic Combat Vehicle ? Modeling and Simulation			-	2.017	7.542
Description: RCV Modeling and Simulation effort will produce the collection and results that will form the physical testing desires. This	ability to experiment in a virtual environment to conduct on swill provide the initial data set to inform the operational	lata			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020							
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A <i>I Robotics Development</i>) Project (Number/Name) CF4 I Robotic Combat Vehicle (RCV) NGCV-CFT							
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2019	FY 2020	FY 2021				
experimentation in the RCV Campaign of Learning as well as feed initial data to MUM-T, CONOPs and TTPs. As test data is collected, high fidelity simulations be refined in a virtual test environment to enable virtual test ? fix ? test cycles in									
<i>FY 2020 Plans:</i> This effort conducted a series of virtual experiments of multiple RCV concepts is mobility, lethality, and aided target recognition systems (AiTR) capabilities using operational environment and tested with trained soldiers to provide a RCV under formations. The models were based upon input from industry science advisory Soldier feedback on how to implement that was assessed to help inform the pu- platoon level force-on-force simulation experimentation.	the ICT) ets in								
FY 2021 Plans: This effort will continue the series of virtual experiments for Phase 3 RCV concernobility, lethality, and AiTR capabilities using accurate technology models simular with trained soldiers to provide a RCV understanding for future BCT formations experiment and the tactics, techniques, and procedures employed.	e d al								
FY 2020 to FY 2021 Increase/Decrease Statement: The increase of funding in FY 2021 is due to delayed start of RCV Phase 3 whi FY2021.	ich delays start of Phase 3 simulation activities	s until							
Title: Robotic Combat Vehicle ? Testing and Evaluation			-	2.552	14.071				
Description: RCV Testing effort will perform system verification testing and system of purpose-built platforms. This will expose unexpected issues and ensure the prior to conducting Field Experimentation.	orms tion								
FY 2020 Plans: RCV Risk Reduction effort completed safety testing on the integrated Phase 1 is surrogate platforms began the Soldier MUM-T Experimentation to receive User and to begin CONOP and TTP development based on actual system performan manned fighting control vehicles developed under PE 0603645A Armored Syst Vehicle Prototyping during the Soldier MUM-T Experimentation. FY 2021 Plans:	surrogate platforms. Following safety testing, assessment on the performance of the vehicl nce. Surrogate RCV platforms are controlled b tems Modernization Adv Dev, Project EV7 Cor	he es γ nbat							

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020				
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A <i>I Robotics Development</i>	Project (I CF4 / Rol NGCV-CI	r roject (Number/Name))F4 I Robotic Combat Vehicle (RCV) IGCV-CFT					
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2019	FY 2020	FY 2021			
Phase 2 platforms will conduct system verification testing and go through a full ready to begin safety testing. Platforms will then move into safety release testi the evaluation process for a Safety Release for Soldier use of the RCV vehicles.	s are begin							
FY 2020 to FY 2021 Increase/Decrease Statement: The increase in the FY 2021 funding is due to the increase in the number of RC quantity four (4) to twelve (12), requiring additional test personnel, field-service System lethality capabilities will progress from small-caliber to medium-caliber, testing.	on							
Title: Robotic Combat Vehicle ? Program Management			-	4.889	7.049			
Description: RCV Program Management effort will enable RCV concepting, m integration and build, testing, and all Manned Unmanned Teaming Field Experi	odeling and simulation, detailed design, syste mentation.	m						
FY 2020 Plans: This effort managed all activity under the RCV line of effort to include but not lin supplies, equipment and facilities. Managed RCV concept development, analy Managed detailed design, build integration, and evaluation of the RCV platform testing and operational experimentation.	el, cepts. ase 1							
<i>FY 2021 Plans:</i> Funding supports the Program Management Office (PMO) acquisition, analysis for proposal, and initiation of milestone documentation. This funding also include preparation, industry analysis, and feedback sessions, to include government a and facilities. This will also manage detailed design, build, integration, and eval execution of the Phase 2 testing and operational experimentation and Phase 3	ot nt							
FY 2020 to FY 2021 Increase/Decrease Statement: The increase in the FY 2021 funding will continue to support conclusion of Pha required to support the RCV Phase 3 systems concept development, engineeri vehicles and the PM acquisition support.								
Title: FY 2020 SBIR/STTR Transfer			-	3.567	-			
Description: Funding transferred in accordance with Title 15 USC 638								
FY 2020 Plans:								

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020				
Appropriation/Budget Activity 2040 / 4	Projec CF4 / NGCV	roject (Number/Name) F4 I Robotic Combat Vehicle (RCV) IGCV-CFT						
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2019	FY 2020	FY 2021			
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 Sub	ototals	-	78.559	114.889			
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy The RCV program will provide unmanned combat vehicles to enable use unmanned teaming based operations. Efforts will inform new ways to fig RCV requirements documents to drive future acquisition programs.	ers to assess the capability of the platforms and creat ht, identify system limitations and benefits, and prov	ate new ⁄ide an a	CONOPS ar analytically b	nd doctrine for acked basis fo	manned/ or future			

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Arm	ıy								Date:	February	/ 2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060	ogram Ele 4017A / F	ement (N Robotics I	lumber/Na Developm	ame) ent	Project CF4 / F NGCV-	t (Numbe Robotic Co CFT	r/ Name) ombat Veł	nicle (RC\	/)
Management Service	es (\$ in M	illions)		FY	2019)19 FY 2020		FY 2021 Base		FY 2	2021 CO	2021 FY 2021 CO 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
Robotic Combat Vehicle - Program Management	MIPR	Various : Various	-	-		4.889	Oct 2019	7.049	Oct 2020	-		7.049	Continuing	Continuing	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		3.567		-		-		-	0.000	3.567	-
		Subtotal	-	-		8.456		7.049		-		7.049	Continuing	Continuing	, N/A
Product Developme	nt (\$ in M	illions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
RCV Phase 2 Platform (Company Set)	C/FFP	TBD : TBD	-	-		65.534	Feb 2020	20.908	Nov 2020	-		20.908	Continuing	Continuing	Continuing
RCV Phase 3 Platform (Company Set)	C/CPFF	TBD : TDB	-	-		-		65.319	Mar 2021	-		65.319	Continuing	Continuing	Continuing
		Subtotal	-	-		65.534		86.227		-		86.227	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ons)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
RCV Modeling and Simulation	MIPR	TBD : TBD	-	-		2.017	Oct 2019	7.542	Nov 2020	-		7.542	Continuing	Continuing	, Continuing
RCV Test and Evaluation	MIPR	TBD : TBD	-	-		2.552	Oct 2019	14.071	Oct 2020	-		14.071	Continuing	Continuing	Continuing
		Subtotal	-	-		4.569		21.613		-		21.613	Continuing	Continuing	N/A
			Prior Years	FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		78.559		114.889		-		114.889	Continuing	Continuing	N/A
<u>Remarks</u>															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Army							Date: Feb	oruary	2020	
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name)Project (Number/Name)PE 0604017A / Robotics DevelopmentCF4 / Robotic Combat Vehicle (RCV)NGCV-CFT								
Event Name	FY 2019 FY 2		20	FY 2021	FY 2022	FY 2023		FY 2024		FY 2025	
	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1	2 3 4	1 2 3	3 4	1 2	3 4
RCV Phase 1 – Vehicle Safety Testing and Safety Release	-										
RCV Phase 1 – Soldier Operational Exercise		-									
RCV Phase 2 – Vehicle Design											
RCV Phase 2 – Vehicle Integration / Build											
RCV Phase 2 – Vehicle Shakedown Testing											
RCV Phase 2 – Vehicle Safety Testing and Safety Release											
RCV Phase 2 – Soldier Operational Exercise											
RCV Phase 3 – Vehicle Design											
RCV Phase 3 – Vehicle Integration / Build											
RCV Phase 3 – Vehicle Shakedown Testing											
RCV Phase 3 – Vehicle Safety Testing and Safety Release											
RCV Phase 3 – Soldier Operational Exercise											

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Feb	ruary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program El PE 0604017A / /	lement (Numbe Robotics Develo	e r/Name) Spment	Project (Number/Name) CF4 / Robotic Combat Vehicle (RCV) NGCV-CFT			
	Schedule Details						
	Γ	St	art	E	nd		
Events		Quarter	Year	Quarter	Year		
RCV Phase 1 ? Vehicle Safety Testing and Safety Release		4	2019	2	2020		
RCV Phase 1 ? Soldier Operational Exercise		2	2020	3	2020		
RCV Phase 2 ? Vehicle Design		2	2020	3	2020		
RCV Phase 2 ? Vehicle Integration / Build		3	2020	2	2021		
RCV Phase 2 ? Vehicle Shakedown Testing		1	2021	3	2021		
RCV Phase 2 ? Vehicle Safety Testing and Safety Release		3	2021	2	2022		
RCV Phase 2 ? Soldier Operational Exercise		2	2022	2	2022		
RCV Phase 3 ? Vehicle Design		3	2021	3	2022		
RCV Phase 3 ? Vehicle Integration / Build		2	2022	1	2023		
RCV Phase 3 ? Vehicle Shakedown Testing		2	2023	3	2023		
RCV Phase 3 ? Vehicle Safety Testing and Safety Release		4	2023	1	2024		
RCV Phase 3 ? Soldier Operational Exercise		2	2024	2	2024		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name)Project (NuPE 0604017A / Robotics DevelopmentFD2 / Soldi					umber/Name) lier Robotics 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
FD2: Soldier Robotics Systems	-	2.056	2.771	3.258	-	3.258	1.753	1.791	1.834	1.836	0.000	15.299
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

Pre-acquisition program activities funded by this line is expected to transition to a separate Program Element and Project prior to their first program acquisition Milestone (B or C).

A. Mission Description and Budget Item Justification

Soldier Robotics Systems for Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, Robotic & Autonomous Strategy (RAS), etc.) and by maturing/transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives/ Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation/ transition from Science & Technology (S&T) demonstration projects, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for robotic systems that are transported by vehicle and maneuver under their own power.

Funding supports modernization of the current Ground Robotic fleets by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Robotic Architecture, autonomous operations and other emerging technologies. 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."

FY 2021 funding in the amount of \$1.738 million supporting Unmanned Ground Vehicles program management activities including inter-service support, travel, conducting Analysis of Alternatives (AoA), draft performance specifications, prototype demonstrations, acquisition documents and request for proposal documentation on Enhanced Robotic Payload (ERP) programs, Chemical Biological Radiological and Nuclear (CBRN), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS(LR)), and payload technology maturation efforts.

Funding supports modernization of the current Ground Robotic fleets by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Robotic Architecture, autonomous operations and other emerging technologies. 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.

FY 2021 funding in the amount of \$1.520 will support the analysis of the Soldier Exoskeleton technology that amplifies the strength, endurance, and mobility of its operator, the Soldier. The Soldier Exoskeleton capabilities provide the Army with a deployable, personal tactical performance enhancer. Soldier Exoskeleton variants will be capable of operating in a wide range of environments enhancing combat operations.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: Fe	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A <i>I Robotics Development</i>	Projec FD2 / S	t (Number/N Soldier Robo	lame) tics Systems	
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2019	FY 2020	FY 2021
Title: Soldier Borne Sensor (SBS) / Exoskeleton			1.484	1.450	1.520
Description: The SBS provides the small unit a "quick look" capability with imp buildings, tunnels, obstacles blocking line of sight, and similar concealed threat improvements including camera enhancements, target identification algorithms notifications for specific items of interest. Soldier Exoskeleton variants, ranging capable of operating in a wide range of environments enhancing combat opera	proved Situational Awareness of routes, locations. The budget activity enables payloa , display/controller improvements and user g from Commercial-Off-The-Shelf solutions, wil tions.	d I be			
<i>FY 2020 Plans:</i> Will continue to provide for the capability of transitioning and continuing develop to augment the warfighter strengths and human performance to reduce Soldier and evaluation of potential exoskeleton solutions and completion of initial technic requirement generation and subsequent materiel development decision.	pment of Industry and DoD Exoskeleton efforts load. Continue to provide for the integration nical and programmatic data to inform capabilit	y			
FY 2021 Plans: Will continue to provide for the transitioning and continuing development of Industrengths and human performance to reduce Soldier load into a program of rector refine operational requirements to inform capability requirement generation, assessments to engage in early Soldier evaluations/feedback to reduce acquise Conduct key pre-acquisition activities to include initial document development acquisition documents and draft contract documents and early development activities acquisition activities acquised acquised acquised acquisition documents and draft contract documents and early development activities acquisition activities acquised acquised acquised acquised acquised acquisition documents and draft contract documents and early development activities acquisition activities acquised	er -				
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 increase supports continued evaluation of capabilities.					
Title: UGV Soldier Robotics Development			0.572	1.196	1.738
Description: Soldier Robotics Development is designed to facilitate the transiti into Programs of Record. It informs the acquisition process beforehand allowing Center of Excellence, Maneuver Support Center of Excellence, and the Cyber decisions and affordability trades while writing requirements. UGV Robotics De (Vehicle), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS Link) (CRS(CL)), Common Robotic System (Mission Command/Artificial Intellig Outfits (RS-SKO), Enhanced Robotics Payload (ERP), payload technology mat and Nuclear (CBRN); small, pocket sized, airborne sensors, etc.	ology nent ation tion and cal,				
FY 2020 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020														
Appropriation/Budget ActivityR-1 Program Element (Number/Name)Pro2040 / 4PE 0604017A / Robotics DevelopmentFD:										ect (Number/Name) I Soldier Robotics Systems				
B. Accomplishments/Planned Prog		FY 2019	FY 2020	FY 2021										
Funding is provided for program man (AoA) on Enhanced Robotic Payload System (Light Reconnaissance) Robo	s Robotic													
FY 2021 Plans: Funding is provided for program man acquisition documents, prototype den Analysis of Alternatives (AoA) on Enh (CBRN), Common Robotic System (L	s, t lear forts.													
FY 2020 to FY 2021 Increase/Decree Increase due to adjustments for cost														
Title: FY 2020 SBIR/STTR Transfer										0.125	-			
Description: Funding transferred in a														
FY 2020 Plans: Funding transferred in accordance wi														
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC 638														
	btotals	2.056 2.771		3.258										
C. Other Program Funding Summary (\$ in Millions)														
			<u>FY 2021</u>	<u>FY 2021</u>	FY 2021					Cost To				
EB8: Soldier Borne Sensor (SBS)	<u>FY 2019</u> 3 354	<u>FY 2020</u> -	<u>Base</u> 0.000	<u>000</u>	<u>1otal</u> 0.000	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u> -	<u>+ FY 2025</u> -	Continuing	Continuing			
• W63798: Soldier Borne Sensor (SBS)	24.437	23.362	18.907	-	18.907	18.141	19.081	19.273	3 19.168	Continuing	Continuing			
Remarks														
Pre-acquisition program activities funded by this line transition to a separate Program Element and Project prior to their first program acquisition Milestone (B or C).														

D. Acquisition Strategy

Soldier Robotics Systems will utilize a Robotics Development funding for internal systems engineering, requirements and architecture analysis, AoAs and Technology Readiness Assessments with PdM UGV S&T partners, technology maturation efforts, and studies and analysis in support of program initiation with industry.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / Robotics Development	Project (Number/Name) FD2 / Soldier Robotics Systems
Initial exoskeleton efforts will continue to assess Industry's and DoD eme capability requirement generation, technology maturation, studies and an	erging exoskeleton initiatives performance through nalysis to support acquisition activities leading to p	Soldier demonstrations/feedback to inform rogram initiation.
PE 0604017A: Robotics Development		

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020		
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0604017A <i>I Robotics Development</i>					Project (Number/Name) FD2 / Soldier Robotics Systems					
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	
UGV Program Management Support	MIPR	Multiple : Multiple	0.418	0.390	Feb 2019	0.368	Oct 2019	0.500	Oct 2020	-		0.500	0.000	1.676	Continuing	
SBS and Exoskeleton Program Management Support	Various	Various : Multiple	0.330	1.484	Jun 2019	1.482	Mar 2020	1.520	Mar 2021	-		1.520	0.000	4.816	Continuing	
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.125		-		-		-	0.000	0.125	-	
		Subtotal	0.748	1.874		1.975		2.020		-		2.020	0.000	6.617	N/A	
Product Development (\$ in Millions)			FY 2019		FY 2	FY 2020		FY 2021 Base		FY 2021 OCO						
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	
AoA CRS(H)	MIPR	Multiple : Various	0.258	-		-		-		-		-	0.000	0.258	-	
AoA ERP	MIPR	Multiple : Various	0.421	0.085	Feb 2019	-		-		-		-	0.000	0.506	-	
AoA CRS(LR)	MIPR	Multiple : Various	-	0.049	Feb 2019	-		-		-		-	0.000	0.049	-	
Payload maturation and integration Studies	Various	Various : Multiple	-	-		0.398	Dec 2019	-		-		-	0.000	0.398	-	
Capability Development Studies, Demonstration	Various	Various : Multiple	-	-		0.398	Dec 2019	-		-		-	0.000	0.398	-	
JCAUS IOP V4	MIPR	ARDEC : Picatinny, NJ	0.050	-		-		-		-		-	0.000	0.050	-	
FY 2019 SBIR /STTR Transfer	TBD	TBD : TBD	-	0.048	Oct 2018	-		-		-		-	0.000	0.048	-	
		Subtotal	0.729	0.182		0.796		-		-		-	0.000	1.707	N/A	
Support (\$ in Millions)			FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total					
Cost Category Item Performance Spec Dev	Contract Method & Type MIPR	Performing Activity & Location Various : Multiple	Prior Years -	Cost	Award Date	Cost	Award Date	Cost 0.619	Award Date Feb 2021	Cost	Award Date	Cost 0.619	Cost To Complete 0.000	Total Cost 0.619	Target Value of Contract	
· · ·		· · · ·			L		L		L			1	L			

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Exhibit R-3, RDT&E	Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army											Date:	Date: February 2020			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (NPE 0604017A / Robotics DevelopmentFD2 / Solo					(Number oldier Rot	lumber/Name) dier Robotics Systems				
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	
RFP and Acq Documentation	MIPR	Various : Multiple	-	-		-		0.619	Apr 2021	-		0.619	0.000	0.619	-	
		Subtotal	-	-		-		1.238		-		1.238	0.000	1.238	N/A	
			Prior Years	FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals 1.477 2.056					2.771 3.258 -		3.258	0.000	9.562	N/A						

Remarks

Appropriation/Budget Activity		R-1 Pro	gram Eleme	lumber/	Name)						
2040 / 4			PE 0604017A / Robotics Development FD2 / Sol						otics Sys	tems	
					· · · · ·						
EventName	FY 2019 FY		2020	FY 2021	FY 2022		FY 2023	FY	2024	F	Y 2025
	1 2 3 4	1 2	3 4 1	2 3 4	1 2 3 4	1	2 3 4	1 2	3 4	1 2	3
UGV Robotics Development (ERP, CBRN, CRS-LR, etc.)											
	UGV										
SBS Analysis of Alternatives / Letter of Sufficiency	2011/04										
SBS Market Survey	AGALOG										
	Market Survey										
SBS Request for Proposal (Development/Staffing)											
	RFP (Developme	nt/Staffing)							-		
SBS RFP Release Decision	REP Release Decisi	on									
SBS SSEB											
	SSEB										
SBS MS B/C	2										
	MS	BIC									
SBS Studies/Analysis	Study/Analysis										
Exoskeleton Industry Demonstration & Analysis											
		Industry Demo	nstration & Ans	lysis							
Exoskeleton Market Survey / Request For Information				10 1051							
Evenkelsten Canchility Requirement Analysis			Mar	ket Survey /RFI							
Exoskeleton Capability Requirement Analysis			AoA	, CBA, C-BA							
Exoskeleton Materiel Development Decision											
UGV Robotics Development ERP Risk Reduction											
				UGV RD							

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Febr	uary 2020
ppropriation/Budget Activity 040 / 4	R-1 Program Element (Number/Nar PE 0604017A / Robotics Development	Project (Number/Name) FD2 / Soldier Robotics Systems		
	Schedule Details			
	Start	End		
Events	Quarter	Year	Quarter	Year
UGV Robotics Development (ERP, CBRN, CRS-LR, etc.)	1	2018	4	2024
SBS MDD	1	2018	1	2018
SBS Analysis of Alternatives / Letter of Sufficiency	1	2018	4	2023
SBS Market Survey	1	2018	4	2023
SBS Request for Proposal (Development/Staffing)	1	2018	2	2024
SBS RFP Release Decision	2	2019	2	2019
SBS SSEB	3	2019	1	2020
SBS MS B/C	4	2019	4	2019
SBS Studies/Analysis	1	2018	4	2023
Exoskeleton Industry Demonstration & Analysis	1	2020	4	2021
Exoskeleton Market Survey / Request For Information	1	2021	4	2021
Exoskeleton Capability Requirement Analysis	1	2021	4	2021
Exoskeleton Materiel Development Decision	4	2021	4	2021
UGV Robotics Development ERP Risk Reduction	1	2021	1	2021

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Exhibit R-2A, RDT&E Project J	ustification	: PB 2021 A	Army							Date: Fe	bruary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 06040	r am Elemen 17A / Robot	i t (Number l ics Develop	(Name) oment	Project (N FD3 / Batte Standardiz	ct (Number/Name) Battery Modernization & Interface lardization		
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
FD3: Battery Modernization & Interface Standardization	-	0.821	0.000	0.000	-	0.000	0.000	0.000	0.000	0.00	0.000	0.821
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	
A. Mission Description and Bu The Battery Modernization & Inte Soldier and to reduce the prolife management authority, and reduce hybrids, robotics, vehicles, and I Army while maintaining configur Funding supports modernization early user feedback to support for B. Accomplishments/Planned Title: Acquisition Strategy	dget Item J erface Stand ration of pro uce 38 Com ow density/r ation manag of the curre uture sustain Programs (ustification dardization (oprietary bat munications usage syste gement, life ent battery ty nment and c \$ in Million	(BMIS) prog teries acros -Electronics ms. Battery cycle suppo ypes. Fundi operational r <u>s)</u>	ram was es s the Army s (C-E) batti v standardiz vrt, safety st ing also sup novement o	stablished t . BMIS will ery types, c zation and p tandards, a pports deve operating co	o help bring develop the currently in u policy enforc nd technolog eloping initial oncepts.	greater pow Army Stand ise, to just 3 ement will s gical upgrad	wer efficiend dard Family 3. Expand to support Ope des. to enable r	cy and effect of Batteries o include ba erational Re refinement c	tiveness t s (SFoB), tteries for adiness a of Operatic 7 2019 0.210	o the dismou a central acc generators a t a reduced o onal Requirer FY 2020	unted juisition and cost to the ments and FY 2021
Title: BMIS Standard Family of E	Batteries (SI									0.611		
Description: Finalize research a maintenance and updates will be	and complet e made as te	e assessme echnology a	nt of techno dvances.	logy and p	ortfolios. Or	nce the SFo	B has been	establishe	d,	0.011		
					Accompli	shments/PI	anned Pro	grams Sub	totals	0.821	-	-
<mark>C. Other Program Funding Sur</mark> N/A <u>Remarks</u>	nmary (\$ in	<u>Millions)</u>										

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
204074	PE 0604017AT Robotics Development	FD3 / Battery Modernization & Interface Standardization

D. Acquisition Strategy

BMIS will expand the Army Standard Family of Batteries to include C-E, batteries for generators and hybrids, robotics, vehicles, and low density/usage systems. BMIS will continue to investigate technology advancements of batteries for these systems and provide information and recommendations to applicable Program Managers.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	y								Date:	February	2020	
Appropriation/Budg 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (NPE 0604017A / Robotics DevelopmentFD3 / BattStandardi;						: (Numbe attery Mo rdization	r/Name) dernizatio	n & Interl	ace
Management Servic	es (\$ in M	illions)		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
BMIS Design	Various	Various : Fort Belvoir	0.269	0.255		-		-		-		-	0.000	0.524	-
		Subtotal	0.269	0.255		-		-		-		-	0.000	0.524	N/A
Product Development (\$ in Millions)			FY 2	2019	FY 2	2020	FY : Ba	2021 ase	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
BMIS SFoB Prototype Development	Various	Various : Fort Belvoir, VA	0.332	0.356		-		-		-		-	0.000	0.688	-
		Subtotal	0.332	0.356		-		-		-		-	0.000	0.688	N/A
Support (\$ in Millior	is)			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
BMIS Program Support	Various	Various : Fort Belvoir	0.212	0.210		-		-		-		-	0.000	0.422	-
		Subtotal	0.212	0.210		-		-		-		-	0.000	0.422	N/A
			Prior Years	FY	2019	FY 2	2020	FY : Ba	2021 ase	FY : Of	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	0.813	0.821		0.000		-		-		-	0.000	1.634	N/A
<u>Remarks</u>															

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A							Date: Februar	y 2020	
Appropriation/Budget Activity 2040 / 4		R-1 P PE 06	Program Elemen 604017A / Robot	nt (Number/Name tics Development	9)	Project (Number/Name) FD3 / Battery Modernization & Interface Standardization			
Event Name	FY 2019	FY 202	020 FY 2021 FY 2022			F	Y 2023	FY 2024	FY 2025
Battery & Interface Technical Assessment & Prototype Developr	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1	2 3 4	1 2 3 4	1 2 3 4
Battery Portfolio Assessment/Design									
C-E Battery Requirements Analysis									
Vehicle-Generator Battery Tech Assessment/Adv Prototype									
Army Standard Family of Batteries (SFoB) Updates									

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febru	uary 2020	
propriation/Budget Activity R-1 Program Element (Number/Name) Project (I 40 / 4 PE 0604017A / Robotics Development FD3 / Bat Standard				t (Number/Name) 3attery Modernization & Interfact rdization		
	Schedule Details					
		Start		End		
Events	Qua	rter	/ear	Quarter	Year	
Battery & Interface Technical Assessment & Prototype Development	1	2	2018	4	2019	
Battery Portfolio Assessment/Design	1	2	2018	4	2019	
					2010	

C-E Battery Requirements Analysis

Vehicle-Generator Battery Tech Assessment/Adv Prototype

Army Standard Family of Batteries (SFoB) Updates

2018

2018

2018

1

4

1

2019

2019

2019

1

4

4

xhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name)Project (NPE 0604017A / Robotics DevelopmentFD9 / Rob					Number/Name) botics 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
FD9: Robotics Systems	-	67.868	3.051	3.060	-	3.060	3.009	2.961	3.006	3.014	0.000	85.969
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Robotics Systems for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, etc.) and by maturing / transitioning technology. RDTE funds enable support to capability development of emerging systems currently including Tactical Wheeled Vehicle - Leader Follower (TWV-LF), Assault Breacher Vehicle (ABV), Dismounted Engineer Mobility System (DEMS), and Modular Mission Payloads (MMP). Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives / Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation / transition from Science & Technology (S&T) projects and Robotic Enhancement Program (REP) initiatives, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for large robotic systems that are transported by vehicle, maneuver under their own power, or are installed as robotic applique kits.

Funding will expand Modeling and Simulation (M&S) including Continuous Autonomy Simulation Test Laboratory Environment (CASTLE) capability to test and evaluate Manned Unmanned teaming, combat scenarios or other emerging Robotics program needs. RD funding will utilize the M&S environment to mature and evaluate S&T for inclusion to program requirements, Engineering Change Proposals (ECPs) and/or technical insertions, utilize gaming technology in conjunction with Autonomy Software to develop Training, Tactics and Procedures (TTPs), requirements and CONOPS. In addition, RD funds exploration and development of the Expedient Leader Follower (ExLF) Applique on additional systems (Heavy Expanded Mobility Tactical Truck (HEMTT), Family of Medium Tactical Vehicles (FMTV) and 915 truck fleets) beyond the Palletized Load System (PLS).

Funding also supports modernization of the current Ground Robotic fleets and current Army vehicles by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Robotic Architecture, autonomous operations and other emerging technologies. Funding will also support 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
<i>Title:</i> Tactical Wheeled Vehicle - Leader Follower (TWV-LF) - RD for PdM Applique & Large Unmanned Ground Systems (ALUGS)	5.424	-	-
Description: Tactical Wheeled Vehicle (TWV) Leader Follower (LF) Program in PdM Applique & Large Unmanned Ground Systems (ALUGS) builds upon the Combat Capabilities Development Command (CCDC) Ground Vehicle Systems Center (GVSC) Expedient Leader Follower (ELF) Operational Technology Demonstration (OTD) to provide automation capability to the			

hibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020								
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A <i>I Robotics Development</i>	Project (Nu FD9 / Robo	mber/l tics Sys	lame) stems				
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2019	FY 2020	FY 2021			
Palletized Load System (PLS) A1. Current PdM efforts will lay the groundwork f expanding the CCDC GVSC efforts to include up to seven (7) unmanned Follov and performance risk reduction efforts to include Capabilities Document input, of estimates, capture technical and test data, provide test support, develop Modeli a Software Integration Lab (SIL).	for future Program of Record (PoR) capability ver vehicles. Funding will support cost, sche close analysis of ELF OTD activities that feec ing and Simulation (M&S) use cases, and de	dule cost velop						
Title: Emerging Robotics Systems			1.574	2.912	3.060			
Description: Validation and verification of incremental system software capabil M&S Software-in-the-loop (SIL) and Hardware-in-the-loop (HIL) allowing for trans	ity upgrades for emerging robotic systems th nsition into Program of Record.	rough						
FY 2020 Plans: FY 2020 funding will expand Modeling and Simulation including CASTLE capate Teaming, combat scenarios or other emerging program needs. RD funding will evaluate S&T for inclusion to program requirements, Engineering Change Prop various mission payload development, utilize gaming technology in conjunction Tactics and Procedures (TTPs), requirements and CONOPS and continue valid capability. Funding will support Rapid prototyping to inform emerging programs	bilities to test and evaluate Manned Unmanne utilize the M&S environment to mature and osals (ECPs) and/or technical insertions and with Autonomy Software to develop Training lating simulation scenarios to expand test with a Buy, Try, Decide strategy.	ed ,						
FY 2021 Plans: FY 2021 funding will expand Modeling and Simulation including CASTLE capate Teaming, combat scenarios or other emerging program needs. RD funding will evaluate S&T for inclusion to program requirements, Engineering Change Prop various mission payload development, utilize gaming technology in conjunction Tactics and Procedures (TTPs), requirements and CONOPS and continue valid capability. Funding will support Rapid prototyping to inform emerging programs support the exploration and development of Expedient Leader Follower (ExLF) Mobility Tactical Truck (HEMTT), Family of Medium Tactical Vehicles (FMTV) a an autonomous capability to existing Army vehicles.	pilities to test and evaluate Manned Unmanne utilize the M&S environment to mature and osals (ECPs) and/or technical insertions and with Autonomy Software to develop Training lating simulation scenarios to expand test with a Buy, Try, Decide strategy. In addition, Applique on additional systems (Heavy Expa nd 915 truck fleets) beyond the PLS and pro	ed , funds nded viding						
FY 2020 to FY 2021 Increase/Decrease Statement: Minimal increase from FY 2020 to FY 2021 due to inflation.								
<i>Title:</i> Tactical Wheeled Vehicle - Leader Follower - Combat Capabilities Develo Center (CCDC GVSC) Tech Demo	opment Command Ground Vehicle Systems		42.302	-	-			
Description: Tactical Wheeled Vehicle - Leader Follower (TWV-LF) provides a kit to 10 ALUGS test Palletized Load System (PLS) A1s. For the CCDC GVSC	limited autonomous vehicle software and ap Tech Demo, the applique kit provides a desig	plique inated						

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: F	ebruary 2020)	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A <i>I Robotics Development</i>	Project (Number/N FD9 / Robotics Sys	lame) stems	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
manned Leader vehicle which leads a line of 3 optionally manned Follow directional and speed guidance to the Follower vehicles to follow the Lea primary purposes for Leader Follower is to improve Force Protection and Army to demonstrate and operationally assess an unmanned vehicle cap technology. The Army will build, and test prototype systems for safety rel	rer vehicles. The Leader vehicle wirelessly provides ader vehicle with no driver input or unmanned. The I increase logistics throughput. Funding allows the pability with operational units and users to validate t lease, Soldier use, and further technology maturation	he pn.		
<i>Title:</i> Robotic Combat Vehicle ? Experimental Unit Prototypes - Combat Systems Center (CCDC GVSC)	Capabilities Development Command Ground Vehic	cle 18.540	-	-
Description: Robotic Combat Vehicle (RCV) Experimental Unit Prototyp prototypes with the purpose of creating an experimental unit that Soldiers (CONOPS), and new requirements for unmanned combat vehicles to sug a three phase approach to promote multiple industry partners to provide experimentation with the intent of defining requirements for future RCV p surrogate RCV platforms to get armed unmanned systems into Soldier?s 1 delivers a platoon set of modified M113s with remote weapons stations combat capability and to help refine requirements based on user feedbace in Phase 3. Phase 2 adds an additional two platoons of surrogate RCVs to better understand how RCVs will be used in the future fight and to refin RCVs. Lessons learned from the phase 1 soldier experimentation will dibuilt RCV effort which will competitively deliver up to a company set of R Soldier evaluation. CONOPs and TTPS developed under Phase 2 will in ultimately form the basis for a decision point to move forward with a process.	ing effort will produce unmanned combat vehicle s will use to create new Concepts of Operations oport Army Modernization priorities. Effort will lever innovative, armed unmanned platforms for soldier orogram of record. The first two phases will focus o s hands for experimentation as quickly as possible. in order to start to define how an RCV can augme ck for a follow-on purpose built RCV effort which will to enable soldiers to execute company level mane ne software behaviors and control strategies of the rectly shape the requirements for the Phase 3 purp CVs through at least 2 industry partners for an exten- form extended operations experiment in phase 3 a surement of RCVs.	age n Phase nt I start uvers ose nded nd		
Title: FY 2018 NDAA SEC 825 MDAP Cost Overrun (CCDC GVSC)		0.028	-	-
Description: FY 2018 NDAA SEC 825 MDAP Cost Overrun (CCDC GV	SC)			
Title: FY 2020 SBIR/STTR Transfer		-	0.139	-
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:				

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020				
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / Robotics Development	ame)Project (Number/Name)ventFD9 / Robotics Systems						
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2019	FY 2020	FY 2021			
Funding transferred in accordance with Title 15 USC 638								
	Accomplishments/Planned Programs Subt	otals	67.868	3.051	3.060			
 <u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> Pre-acquisition program activities funded by this line transition to a separate <u>D. Acquisition Strategy</u> Robotics Development (RD) is designed to facilitate the transition of robotics emerging programs of record. It informs the acquisition process early in the affordability trades while writing requirements. 	Program Element and Project prior to their first p and autonomous systems technology from Scie development cycle allowing key stakeholders the	rogran nce an ability	n acquisition d Technology / to make inte	Milestone (B y (S&T) proje gration decis	or C). cts into ions and			
Product Manager Applique and Large Unmanned Ground Systems (PdM AL Technology Demonstration (OTD) to provide a limited autonomous vehicle c Heavy Expanded Mobility Tactical Truck (HEMTT), Family of Medium Tactica activities that feed cost estimates, capture technical and test data, provide te Integration Lab (SIL). Efforts may support Rapid prototyping to inform emerg used to evaluate Commercial Off the Shelf (COTS), Government Off the She enhance Soldier combat effectiveness. Actual operational user feedback and in support of a return on investment to support future Army decision making.	UGS) builds upon the CCDC GVSC Expedient L apability to Tactical Wheeled Vehicles including t al Vehicle (FMTV). Efforts include Capabilities Do st support, develop Modeling and Simulation (Ma ing programs and other Army systems. A "buy/le eff (GOTS) and Non-Developmental Item (NDI) ro d evaluation results obtained will inform emerging	eader he Pal cume &S) ca ase, tr botics capal	Follower (Exl lletized Load nt input, close pabilities, and y and inform" products tha pilities and re	-F) Operation System (PLS e analysis of d develop a S methodology t have the po quirements d	nal) A1, OTD oftware y may be tential to ocuments			

Robotic Combat Vehicle (RCV) funding supports Systems Engineering, Requirements, Cost Analysis, Joint Capabilities Technology Demonstration (JCTD) support, and technology transition plans.

Combat Capabilities Development Command (CCDC) Ground Vehicle Systems Center (GVSC) funding allows the Army to demonstrate and operationally assess an unmanned vehicle capability with operational units and users to validate the technology. The Army will build, and test prototype systems for safety release, Soldier use, and further technology maturation.

Robotic Combat Vehicle (RCV) Experimental Unit Prototyping will provide unmanned combat vehicles to enable users to assess the capability of the platforms and created new CONOPS and doctrine for manned/unmanned teaming based operations. Efforts will inform new CONOPS, identified system limitations and benefits and provide an achievable, analytically backed basis for future RCV requirements documents to drive future acquisition programs.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060	ogram Ele 4017A <i>I F</i>	ement (N Robotics I	u mber/N a Developm	a me) ent	Project FD9 / R	(Number obotics S	r/ Name) Systems		
Management Service	es (\$ in M	lillions)		FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	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 FP PdM ALUGS	Allot	PM FP : Warren, MI	2.350	1.025	Nov 2018	0.454	Oct 2019	0.500	Oct 2019	-		0.500	0.000	4.329	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	N/A : N/A	-	0.028		-		-		-		-	0.000	0.028	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.139		-		-		-	0.000	0.139	-
		Subtotal	2.350	1.053		0.593		0.500		-		0.500	0.000	4.496	N/A
Product Development (\$ in Millions)			FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
RCV/ACO M&S SIL ALUGS	MIPR	CCDC GVSC : Warren, MI	-	1.100	Dec 2018	-		-		-		-	0.000	1.100	-
SMET Modular Mission Payloads ALUGS	TBD	TBD : TBD	-	1.000	Dec 2018	-		-		-		-	0.000	1.000	-
Leader Follower (CCDC GVSC) Tech Demo A Kit	C/CPFF	Robotic Research : Baltimore, MD	10.400	15.544	Oct 2018	-		-		-		-	0.000	25.944	-
Leader Follower (CCDC GVSC) Tech Demo B Kit	C/CPFF	Oshkosh : Oshkosh, WI	9.402	12.021	Dec 2018	-		-		-		-	0.000	21.423	-
Leader Follower (CCDC GVSC) Integrated System Integrator	C/CPFF	Lockheed Martin : Dallas, TX	4.500	3.199	Oct 2018	-		-		-		-	0.000	7.699	-
Leader Follower (CCDC GVSC) Warfighter Machine Interface	C/CPFF	DCS Corp : Boston, MA	2.500	4.477	Nov 2018	-		-		-		-	0.000	6.977	-
RCV Risk Reduction Platform Development (CCDC GVSC)	C/CPFF	To Be Determined : To Be Determined	-	18.540	Nov 2018	-		-		-		-	0.000	18.540	-
RD M&S SIL ALUGS	MIPR	CCDC GVSC and various : Warren, MI	-	-		1.494	Oct 2019	1.160	Oct 2019	-		1.160	0.000	2.654	-
		Subtotal	26.802	55.881		1.494		1.160		-		1.160	0.000	85.337	N/A
		Cubiciai	20.002	00.001		1.404		1.100				1.100	0.000		107

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	/				R-1 Pro PE 060	o gram Ele 4017A <i>I F</i>	ement (N Robotics I	l umber/N a Developm	a me) ent	Project FD9 / R	(Numbe obotics S	r/Name) Systems		
Support (\$ in Millions	5)		ſ	FY	2019	FY	2020	FY 2 Ba	2021 ase	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
PdM ALUGS Support	MIPR	Various : Multiple locations	4.109	3.173	Oct 2018	0.964	Oct 2019	1.000	Oct 2019	-		1.000	0.000	9.246	-
SMET Modular Mission Payloads ALUGS	MIPR	PdM ALUGS : Warren, MI	-	0.550	Oct 2018	-		-		-		-	0.000	0.550	-
Technology Demo support (CCDC GVSC)	MIPR	CCDC GVSC : Warren, MI	1.000	1.978	Oct 2018	-		-		-		-	0.000	2.978	-
		Subtotal	5.109	5.701		0.964		1.000		-		1.000	0.000	12.774	N/A
Test and Evaluation ((\$ in Milli	ions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
Leader Follower (CCDC GVSC) Tech Demo Testing	MIPR	ATEC : Aberdeen, MD	0.500	0.200	Oct 2018	-		-		-		-	0.000	0.700	-
Leader Follower (CCDC GVSC) Tech Demo Data Logger	MIPR	ATEC : Aberdeen, MD	0.500	0.200	Oct 2018	-		-		-		-	0.000	0.700	-
Leader Follower (CCDC GVSC) Testing	MIPR	Army Test and Evaluation Command (ATEC) : Aberdeen Proving Ground, MD	-	3.933	Dec 2018	-		-		-		-	0.000	3.933	-
Leader Follower (CCDC GVSC) Data Logger	MIPR	Army Test and Evaluation Command (ATEC) : Aberdeen Proving Ground, MD	-	0.750	Dec 2018	-		-		-		-	0.000	0.750	-
PdM ALUGS RD ATEC support	MIPR	ATEC : Aberdeen, MD	-	0.150	Nov 2018	-		0.400	Nov 2020	-		0.400	0.000	0.550	-
		Subtotal	1.000	5.233		-		0.400		-		0.400	0.000	6.633	N/A
									,						

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2	bit R-3, RDT&E Project Cost Analysis: PB 2021 Army											2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)ProjePE 0604017A / Robotics DevelopmentFD9 /						t (Number/Name) Robotics Systems						
Prior Years FY 2019			FY 2	2020	FY 2 Ba	021 se	FY 2 OC	021 O	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals 35.261 67.868						3.060		-		3.060	0.000	109.240	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021	l Army							Date:	February	2020		
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name)Project (Number/Name)PE 0604017A / Robotics DevelopmentFD9 / Robotics Systems									
Event Name	FY 2019	FY 20	020	FY 2021	FY 2022	F	Y 2023	FY	2024	FY	2025	
	1 2 3 4	1 2 3	3 4	1 2 3 4	1 2 3 4	1 :	2 3 4	1 2	3 4	1 2	3 4	
LEADER FOLLOWER ALUGS												
LF ALUGS MODELING & SIMULATION (M&S)	LF M&S											
LF Improve M&S Functionality & increase utility	LF Improve M&S function	ality										
LF M&S continued testing	LF M&S cont. testing											
LF M&S Use Case Development	LF M&S Use Case Dev											
LF M&S Validation, Verification Accreditation	LF Ver/Val/Accreditation											
LF Milestone C Documentation	LF MS C Do	cument Preparat	ion									
ALUGS Emerging Systems Upgrades												
RD Emerging Systems Capability Upgrade Validation and	Ve RD Emerging systems V/	Ý										
CCDC GVSC LEADER FOLLOWER Operational Technolog	y Demonstration (OTD)	8										
CCDC GVSC LF Contractor Engineering Test	Contractor Test											
ATEC LF Urgent Material Release (UMR) & Safety Test (CC	ATEC test											
CCDC GVSC LF Applique Build (140) for Tech Demo	Build Excursion Ap	oplique Systems ((140)									

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army Date: February 2020											
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06	rogram Elemer	nt (Number/Name tics Development	e)	Project (N FD9 / Rob	lumber/Name) ootics Systems			
	EV 2010	EX 20	20	EV 2024	EV 2022		EV 2022	EV 2024	EV 2025		
Event Name	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1	2 3 4	1 2 3 4	1 2 3 4		
CCDC GVSC LF Urgent Material Release (UMR)		1 UMR									
CCDC GVSC LF First Unit of Issue		FUI									
CCDC GVSC LF Tech Demo Assessment		Evaluate LF sy	stems in f	FORSCOM units							
Robotic Combat Vehicle (RCV) Risk Reduction (CCDC GVSC											
RCV Experimental Unit Prototyping - Contract Award	RCV Experimental Unit P	rototyping - Contra	act Award								
RCV Phase 1 - M113 By-Wire Integration	RCV RR - M113 By-Wire	Integration									
RCV Phase 1 - Unmanned M113 Shake Out Testing	RCV RR - U	nmanned M113 St	hake Out	Testing							
RCV Phase 1 - ATEC Safety Testing	RCV	RR - ATEC Safety	Testing								
ABV RCS market research		A	BV market	t research							
ABV RFP release				ABV RFP releas	54						

hibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Febr	uary 2020
propriation/Budget ActivityR-140 / 4PE	1 Program Element (Number/I 0604017A / Robotics Develop	Name) F ment F	Project (Number/Nam D9 / Robotics System	ne) ns
Sched	ule Details			
	Star	ť	Er	nd
Events	Quarter	Year	Quarter	Year
LEADER FOLLOWER ALUGS	1	2017	4	2022
LF ALUGS MODELING & SIMULATION (M&S)	1	2017	4	2021
LF M&S Data Source Matrix Development	1	2017	4	2017
LF M&S Initial Capability Development	4	2017	2	2018
LF Improve M&S Functionality & increase utility	3	2018	4	2021
LF M&S continued testing	2	2018	4	2022
LF M&S Use Case Development	1	2018	1	2019
LF M&S Validation, Verification Accreditation	4	2018	4	2021
LF Milestone C Documentation	3	2019	4	2020
ALUGS Emerging Systems Upgrades	1	2017	4	2022
RD Emerging Systems Capability Upgrade Validation and Verification	1	2019	4	2021
CCDC GVSC LEADER FOLLOWER Operational Technology Demonstration (OTD) 3	2018	3	2022
CCDC GVSC LF Applique Prototype Build (10) for test	3	2018	4	2018
CCDC GVSC LF Order Items for 140 Applique Systems	3	2018	4	2018
CCDC GVSC LF Contractor Engineering Test	3	2018	2	2019
ATEC LF Urgent Material Release (UMR) & Safety Test (CCDC GVSC)	2	2019	3	2020
CCDC GVSC LF Applique Build (140) for Tech Demo	2	2019	4	2019
CCDC GVSC LF Urgent Material Release (UMR)	1	2020	1	2020
CCDC GVSC LF First Unit of Issue	1	2020	1	2020
CCDC GVSC LF Tech Demo Assessment	1	2020	2	2021
Robotic Combat Vehicle (RCV) Risk Reduction (CCDC GVSC)	4	2019	4	2021
RCV Experimental Unit Prototyping - Contract Award	1	2019	1	2019
RCV Phase 1 - M113 By-Wire Integration	1	2019	4	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army					Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0604017A	Element (Numbe I Robotics Develo	r /Name) opment	Project (N FD9 / Rot	Number/Nar	ne) ms	
		St	art		E	ind	
Events		Quarter	Year	(Quarter	Year	
RCV Phase 1 - Unmanned M113 Shake Out Testing		3	2019		4	2019	
RCV Phase 1 - ATEC Safety Testing		4	2019		2	2020	
ABV RCS market research		3	2020		1	2021	
ABV RFP release		3	2021		3	2021	

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army											Date: February 2020				
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P) Prior					R-1 Program Element (Number/Name) PE 0604020A / Cross Functional Team (CFT) Advanced Development & 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			
Total Program Element	-	8.225	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.225			
CF1: CFT Advanced Development & Prototyping	-	8.225	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.225			

Note

This program was a FY 2019 new start. FY 2020 and out funding supporting CFT Network efforts has been realigned to 0604541A Unified Network Transport.

A. Mission Description and Budget Item Justification

This Program Element (PE) funds experimental prototyping and technical demonstrations of selected technologies conducted by Cross-Functional Teams (CFT) in order to inform and refine the development of initial capability documents in support of Long Range Precision Fires (LRPF), Next Generation Combat Vehicle (NGCV), Future Vertical Lift (FVL), Network Command, Control Communication, and Intelligence (NC3I), Assured Positioning, Navigation, and Timing (APNT), Air and Missile Defense (AMD), Soldier Lethality, and Synthetic Training Environment (STE). Funding facilitates the experimentation and demonstration of priority technologies to ensure that planned capabilities are technologically feasible, affordable, and available to Soldiers. Benefits include the narrowing of capability gaps by developing capability documents and rapidly transitioning leader-approved capability requirements to the Army Acquisition System. In project CF1, CFT will conduct pre-Materiel Solution Analysis Phase experimentation and technical demonstrations to enable capability document development and improve the decision making for potential programs of record.

This investment supports the Chief of Staff of the Army (CSA) six modernization priorities.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	9.488	0.000	0.000	-	0.000
Current President's Budget	8.225	0.000	0.000	-	0.000
Total Adjustments	-1.263	0.000	0.000	-	0.000
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-1.263	-			
SBIR/STTR Transfer	-	-			

Exhibit R-2A, RDT&E Project Ju				Date: Febr	uary 2020							
Appropriation/Budget Activity 2040 / 4						am Elemen 20A / Cross T) Advanceo G	t (Number/ Functional d Developm	Project (N CF1 / CFT Prototyping	Number/Name) T Advanced Development & Ig			
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
CF1: CFT Advanced Development & Prototyping	-	8.225	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.225
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project was a new start in FY 2019.

A. Mission Description and Budget Item Justification

This project funds pre-Materiel Solution Analysis Phase experimentation and technical demonstrations conducted by the eight Cross-Functional Teams (CFT) to inform and refine the development of Initial Capability Documents (ICD) to support Materiel Development Decision (MDD) in the areas of Long Range Precision Fires (LRPF), Next Generation Combat Vehicle (NGCV), Future Vertical Lift (FVL), Network Command, Control Communication, and Intelligence (NC3I), Assured Positioning, Navigation, and Timing (APNT), Air and Missile Defense (AMD), Soldier Lethality, and Synthetic Training Environment (STE). CFT advanced development and prototyping efforts will narrow an existing capability gap by informing capability document development and rapidly transition leader-approved capability requirements to the Army Acquisition System. This will allow for faster development of capabilities and ensure planned capabilities are technologically feasible, affordable, and available to the Soldier.

This investment support the Chief of Staff of the Army (CSA) six modernization priorities

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: CFT Experimental prototyping and technology Demonstration	8.225	-	-
Description: Cross-Functional Teams (CFT) conduct experimental prototyping and technical demonstrations) in order to inform and refine the development of initial capability documents in support of Long Range Precision Fires (LRPF), Next Generation Combat Vehicle (NGCV), Future Vertical Lift (FVL), Network Command, Control Communication, and Intelligence (NC3I), Assured Positioning, Navigation, and Timing (APNT), Air and Missile Defense (AMD), Soldier Lethality, and Synthetic Training Environment (STE).			
Accomplishments/Planned Programs Subtotals	8.225	-	-
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020	
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0604020A / Cross Functional	CF1 / CFT	Advanced Development &
	Team (CFT) Advanced Development &	Prototyping	9
	Prototyping		

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

<u>Remarks</u>

Transition of technologies are aligned with multiple RDT&E or Procurement lines, to include but not limited to:

OPA: Signal Modernization B00010; Net Warrior R80501; Tactical Network Radio System Handheld B95006; Manpack B95007; COTS Tactical Radio B98105. RDT&E: Command Post Computing Environment 654818323

D. Acquisition Strategy

Activities will be conducted both in-house and through multiple competitively-awarded contracts using best value source selection procedures.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020			
Appropriation/Budge 2040 / 4	ppropriation/Budget Activity 040 / 4							R-1 Program Element (Number/Name) PE 0604020A / Cross Functional Team (CFT) Advanced Development & Prototyping					Project (Number/Name) CF1 / CFT Advanced Development & Prototyping				
Product Developmer	nt (\$ in M	illions)		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		
CFT Experimental Prototyping and technology demonstrations	Various	CACI : Washington DC	-	3.525		-		-		-		-	0.000	3.525	-		
E31 Exploit Enhance Enable and Influence	Various	GSA FEDSIM/ CACI : Washington D.C.	-	3.700	May 2019	-		-		-		-	0.000	3.700	-		
	Subtotal - 7.22					-		-		-		-	0.000	7.225	N/A		
Support (\$ in Million	s)			FY	2019	FY 2	2020	FY : Ba	2021 ase	FY	2021 CO	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		
SETA	TBD	Perspecta : APG Maryland	-	1.000	May 2019	-		-		-		-	0.000	1.000	-		
		Subtotal	-	1.000		-		-		-		-	0.000	1.000	N/A		
			Prior Years	FY	2019	FY 2	2020	FY : Ba	2021 ase	FY	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
Project Cost Totals - 8.225					0.000				-	0.000	8.225	N/A					
Remarks																	

Contracting will be conducted through Other Transactional Agreements or through FAR Part 12 Commercial Acquisition.

Exhibit R-4, RDT&E Schedule Profile: PB 20	021 Army				Date: February	2020	
Appropriation/Budget Activity 2040 / 4		R-1 Program Elemen PE 0604020A <i>I</i> Cross Team (CFT) Advanced Prototyping	Project (N CF1 / CF1 Prototypin	(Number/Name) FT Advanced Development & ing			
Event Name	FY 2019 FY	2020 FY 2021 3 4 1 2 3 4	FY 2022	FY 2023	FY 2024	FY 2025	
Cross Functional Teams							
Analysis of Technical Solutions							
			II		1	1]	

hibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: Febru					
propriation/Budget Activity 40 / 4	R-1 Program PE 0604020A <i>Team (CFT) A</i> <i>Prototyping</i>	Element (Numbe I Cross Functiona dvanced Developi	Project (Numb CF1 / CFT Adva Prototyping	t (Number/Name) CFT Advanced Development & ping			
	Schedule Details	S					
		St	art		End		
Events		Quarter	Year	Quart	er Year		
Cross Functional Teams		3	2019	1	2021		
			1				

Exhibit R-2, RDT&E Budget Item	Justificat	t ion: PB 202	21 Army							Date: Febr	uary 2020		
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Protot	Appropriation/Budget Activity 040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0604021A <i>I Electronic Warfare Technology Maturation (MIP)</i>							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost	
Total Program Element	-	0.000	23.043	22.840	-	22.840	0.000	0.000	0.000	0.000	0.000	45.883	
AW7: Electronic Warfare Technology Maturation (MIP)	22.840	-	22.840	0.000	0.000	0.000	0.000	0.000	45.883				

A. Mission Description and Budget Item Justification

Terrestrial Layer System (TLS) provides Army maneuver forces integrated full spectrum Signals Intelligence (SIGINT), Electronic Warfare (EW), and Cyber-enabling non-kinetic offensive operation options to Brigade Combat Team (BCT) and Expeditionary-Military Intelligence Brigade (EMIB) commanders. TLS' information superiority provides Indications and Warnings, Force Protection and Situational Awareness to influence the commander's decision cycle, improve targeting timeliness and accuracy, and provide the maneuver commander with electronic attack and offensive cyber warfare options to deny, degrade, disrupt, or otherwise manipulate the targeted force. TLS employs technologically advanced systems with a modular open-system approach for multiple operation configurations that can be efficiently sustained and effectively upgraded to provide capabilities against changing near peer and emerging threats to address multi-domain capability gaps.

8. Program Change Summary (\$ in Millions)	FY 2019	<u>FY 2020</u>	<u>FY 2021 Base</u>	FY 2021 OCO	<u>FY 202</u>	<u>1 Total</u>
Previous President's Budget	0.000	18.043	18.800	-		18.800
Current President's Budget	0.000	23.043	22.840	-		22.840
Total Adjustments	0.000	5.000	4.040	-		4.040
 Congressional General Reductions 	-	-				
 Congressional Directed Reductions 	-	-				
 Congressional Rescissions 	-	-				
 Congressional Adds 	-	5.000				
 Congressional Directed Transfers 	-	-				
 Reprogrammings 	-	-				
 SBIR/STTR Transfer 	-	-				
 Adjustments to Budget Years 	-	-	4.040	-		4.040
Congressional Add Details (\$ in Millions, and Inclue	les General Redu	ctions)		ſ	FY 2019	FY 2020
Project: AW7: Electronic Warfare Technology Maturati	on (MIP)					
Congressional Add: Counter drone RF-signal base	d targeting				-	5.000
			Congressional Add Subtota	als for Project: AW7	-	5.000
			Congressional Add To	otals for all Projects	-	5.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020	e: February 2020		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0604021A <i>I Electronic Warfare Technology Maturation (MIP)</i>			
Change Summary Explanation				
Component Development & Prototypes (ACD&P) Change Summary Explanation Additional \$4.040 million required in FY 2021 to continue TLS develop	opment activities.			
PE 0604021A: Electronic Warfare Technology Maturation				

Exhibit R-2A, RDT&E Project Ju	nibit R-2A, RDT&E Project Justification: PB 2021 Army												
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060402 Technology	am Elemen 21A / Electro y Maturation	t (Number/ onic Warfare n (MIP)	Name) e	Project (Number/Name) AW7 I Electronic Warfare Technology Maturation (MIP)				
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	
AW7: Electronic Warfare Technology Maturation (MIP)	-	0.000	23.043	22.840	-	22.840	0.000	0.000	0.000	0.000	0.000	45.883	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

Terrestrial Layer System (TLS) provides Army maneuver forces integrated full spectrum Signals Intelligence (SIGINT), Electronic Warfare (EW), and Cyber-enabling non-kinetic offensive operation options to Brigade Combat Team (BCT) and Expeditionary-Military Intelligence Brigade (EMIB) commanders. TLS' information superiority provides Indications and Warnings, Force Protection and Situational Awareness to influence the commander's decision cycle, improve targeting timeliness and accuracy, and provide the maneuver commander with electronic attack and offensive cyber warfare options to deny, degrade, disrupt, or otherwise manipulate the targeted force. TLS employs technologically advanced systems with a modular open-system approach for multiple operation configurations that can be efficiently sustained and effectively upgraded to provide capabilities against changing near peer and emerging threats to address multi-domain capability gaps.

Justification:

FY 2021 Base funding in the amount of \$22.840 million provides for, but is not limited to, the development and evaluation of component level TLS technologies.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Technical / Program Management	-	2.282	2.282
Description: Funds will provide for technical engineering and program management.			
<i>FY 2020 Plans:</i> FY 2020 technical engineering and program management support for TLS.			
<i>FY 2021 Plans:</i> FY 2021 technical engineering and program management support for TLS.			
Title: Systems Engineering and Component Prototyping	-	15.761	20.558
Description: Funds will provide for, but are not limited to development, engineering and evaluation of component level technologies to include antennas, radios, software architecture and other Signals Intelligence (SIGINT), Electronic Warfare Support (ES), Electronic Attack (EA) and Cyber enabling components to mature technical feasibility and reduce Critical Technology Element (CTE) risks. Funds will support, but are not limited to the development capabilities to enhance and integrate Signals of Interest, develop system level designs, reduce Size, Weight and Power (SWaP), to mature components into an emerging Program of Record (PoR) level technology maturation level, and to support the evaluation environment to conduct required developmental events.			

Exhibit R-2A, RDT&E Project Just	ification: PB	2021 Army							Date: Fe	bruary 2020			
Appropriation/Budget Activity 2040 / 4				R-1 Pi PE 06 <i>Techn</i>	r ogram Eler 04021A / Ele ology Matura	nent (Numb ectronic Warl ation (MIP)	er/Name) ^f are	Projec AW7 / <i>Matura</i>	Project (Number/Name) AW7 I Electronic Warfare Technology Maturation (MIP)				
B. Accomplishments/Planned Pro	grams (\$ in I	<u>Millions)</u>							FY 2019	FY 2020	FY 2021		
FY 2020 Plans: Conduct development of SIGINT, E mature critical technologies, develo can be evaluated for affordability, fe	ents to n that												
FY 2021 Plans: Continue development of SIGINT, E and evaluate critical technologies, c components and reduce component technical maturity; all of which will re	ind												
FY 2020 to FY 2021 Increase/Deci Increased funding in FY 2021 due to													
	ototals	-	18.043	22.840									
							FY 2019	FY 20	20				
Congressional Add: Counter drone	e RF-signal ba	ased targetin	Ig				-	5.0	000				
FY 2020 Plans: Counter drone RF-	signal based t	argeting											
				Cong	ressional A	dds Subtota	ls -	5.0	000				
C. Other Program Funding Summ	arv (\$ in Milli	ons)					·						
Line Item • FJ5: Terrestrial	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u> 38,105	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u> 38,105	<u>FY 2022</u> 51.250	<u>FY 2023</u> 20.980	FY 202	<u>4 FY 2025</u>) -	Cost To Complete 0.000	<u>Total Cost</u> 122.425		
Layer System (MIP) • B97610: TERRESTRIAL LAYER SYSTEM (TLS) (MIP)	-	-	8.081	-	8.081	39.710	88.133	167.06	6 186.448	0.000	489.438		
<u>Remarks</u>													
D. Acquisition Strategy A competitive acquisition approach integrated signals intelligence, elec analyze, and demonstrate potential	for componer tronic warfare capabilities a	nt developme and cyber c nd alternativ	ent and proto apability to t e solutions.	otyping is pla he Army. Th These effort	inned for TL ese efforts v s will quantif	S using a tail vill be used, t y the respect	ored acquisit out are not lin tive maturity a	ion strate nited to id and effec	egy to rapidly dentify, devel tiveness to m	deliver an in op, prototype iitigate capal	itial e, evaluate, bility gaps		

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020	
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0604021A I Electronic Warfare	AW7 I Elec	ctronic Warfare Technology
	Technology Maturation (MIP)	Maturation	(MIP)

against changing near peer representative enemy target sets and operational scenarios. Enhanced capability and other technologies to provide overmatch capabilities will be evaluated for merit and will provide increased performance for production of TLS systems in FY 2022.

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Program Element (Number/Name)Project (NumberPE 0604021A / Electronic WarfareAW7 / ElectronicTechnology Maturation (MIP)Maturation (MIP)						r/ Name) Warfare T	echnolog	<i>iy</i>	
Product Developmer	nt (\$ in Mi	illions)		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 Engineering and Prototyping	C/Various	TBD : TBD	-	-		15.761	Feb 2020	20.558	Feb 2021	-		20.558	0.000	36.319	-
Counter drone RF-signal based targeting	C/Various	TBD : TBD	-	-		5.000		-		-		-	0.000	5.000	-
		Subtotal	-	-		20.761		20.558		-		20.558	0.000	41.319	N/A
Support (\$ in Million	s)			FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
Technical / Program Management	C/CPFF	AASKI Technology : Tinton Falls, NJ	-	-		1.141	Nov 2019	1.141	Nov 2020	-		1.141	0.000	2.282	-
Technical / Program Management	MIPR	Various Matrix Support Organizations : Abderdeen Proving Grounds, MD	-	-		1.141	Nov 2019	1.141	Nov 2020	-		1.141	0.000	2.282	-
	·	Subtotal	-	-		2.282		2.282		-		2.282	0.000	4.564	N/A
Prior Years		Prior Years	FY	2019	FY	2020	FY 2021 Base		FY : Of	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
	Project Cost Totals -					23.043		22.840		-		22.840	0.000	45.883	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021	Army									Dat	te: Fe	ebruary	2020		
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 <i>Techn</i>	rogram 604021A nology N	Elemer	n t (Num onic Wa n (MIP)	ber/Name arfare	e)	Project (AW7 / El Maturatic	(Number/Name) Electronic Warfare Technology ion (MIP)					
Event Name FY 2019 F				FY	2021	F	Y 2022		FY 2023		FY 2024		F	FY 2025	
	1 2 3 4	1 2 3	3 4	1 2	3 4	1 2	3 4	1	2 3 4	1	2	3 4	1	2 3	4
Milestone A															
Component Engineering and Prototyping															
Developmental Testing (A)															
Developmental Testing (B)															
Milestone B (Transition from BA 4 to BA 5 RDT&E)				2											
Integration & Evaluation on Platform 1															
Developmental Testing (C)															
Milestone C / Production Decision						▲									
Component Procurement															
Production on Platform 1															
Limited User Testing of TLS on Platform 1							4								
First Unit Equipped with TLS on Platform 1							5								
Iterative Prototyping															

Appropriation/Budget Activity Project (Number/Name) Project (Number/Name) Project (Number/Name) 2040 / 4 PC 0664021 / Electronic Wardrare PC 0664021 / Electronic Wardrare Project (Number/Name) Project (Number/Name) Event Name 1 2 3 4	Exhibit R-4, RDT&E Schedule Profile: PB 2021	Army							Date: February	2020		
Event Name I Z 3 4 1	Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 <i>Techi</i>	Program Elemen 604021A / Electro nology Maturation	n t (Number/Name onic Warfare n (MIP)	e)	Project (Number/Name) AW7 I Electronic Warfare Technology Maturation (MIP)				
Event Name I Z I I Z I Z I Z I Z I Z <th<< th=""><th></th><th>EX 2010</th><th>EX 200</th><th>20</th><th>EV 2024</th><th>EV 2022</th><th></th><th>EV 2022</th><th>EX 2024</th><th>EV 2025</th></th<<>		EX 2010	EX 200	20	EV 2024	EV 2022		EV 2022	EX 2024	EV 2025		
Integration a Evaluation on Platform 2 Production on Platform 2	Event Name	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1	2 3 4	1 2 3 4	1 2 3 4		
Production on Platform 2	Integration & Evaluation on Platform 2											
	Production on Platform 2											

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Feb	uary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0604021A <i>Technology M</i>	Element (Number I Electronic Warfa aturation (MIP)	e r/Name) are	Project (Number/Name) AW7 I Electronic Warfare Technology Maturation (MIP)		
	Schedule Detail	S				
		St	art	E	nd	
Events		Quarter	Year	Quarter	Year	
Milestone A		2	2020	2	2020	
Component Engineering and Prototyping		3	2020	2	2021	
Developmental Testing (A)		4	2020	4	2020	
Developmental Testing (B)		1	2021	1	2021	
Milestone B (Transition from BA 4 to BA 5 RDT&E)		2	2021	2	2021	
Integration & Evaluation on Platform 1		2	2021	1	2022	
Developmental Testing (C)		3	2021	4	2021	
Milestone C / Production Decision		1	2022	1	2022	
Component Procurement		2	2021	1	2022	
Production on Platform 1		2	2022	2	2025	
Limited User Testing of TLS on Platform 1		4	2022	4	2022	
First Unit Equipped with TLS on Platform 1		4	2022	4	2022	
Iterative Prototyping		1	2022	1	2027	
Integration & Evaluation on Platform 2		4	2021	1	2023	
Production on Platform 2		1	2023	1	2027	

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Exhibit R-2, RDT&E Budget Item	Justificat	i on: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Protot	st & Evalua types (ACE	ation, Army I 0&P)	BA 4: Adv	anced	R-1 Program Element (Number/Name) PE 0604035A <i>I Low Earth Orbit (LEO) Satellite Capability</i>							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	22.678	-	22.678	19.881	18.084	27.175	15.986	0.000	103.804
BX7: Low Earth Orbit (LEO) Satellite Capability	-	0.000	0.000	22.678	-	22.678	19.881	18.084	27.175	15.986	0.000	103.804

A. Mission Description and Budget Item Justification

The US Army Tactical Space Strategy provides Tactical Land Component Forces with space capabilities required to enable force projection and maneuver during Multi-Domain Operations. US Army space-based sensors will integrate with commercial and national systems to provides resilient communications, assured PNT and deep sensing capabilities required in the targeting process to enable rapid and responsive sensor-to-shooter applications required to engage and defeat Anti-Access/Area Denial (A2/AD) forces and enable force projection and maneuver in contested Multi-Domain Operations

The LEO Satellite Capability will provide prototyping, development and experimentation of the Tactical Space Layer (TSL) sensors which are designed to provide widearea, responsive deep area sensing required for beyond line of sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. Follow-on persistent prototype tactical sensor capabilities will be operational in FY 2021/2022 and will be integrated with the Army Tactical Intelligence Targeting Access Node (TITAN) ground station to tactically task, receive and disseminate data to directly support live-fire S2S demonstrations and assessments.

All FY 2020 adjustments align program financial structure to Army Modernization Priorities in support of the National Defense Strategy. Work in this Project complements and is fully coordinated with PE 633463 (Tag, Track and Locate). The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Work in this Project is performed by the United States Army Space and Missile Defense Command/Army Forces Strategic Command in Huntsville, AL. FY 2020 realignments are due to financial restructuring in support of Army Modernization Priorities.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	22.678	-	22.678
Total Adjustments	0.000	0.000	22.678	-	22.678
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	22.678	-	22.678

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060403 Satellite Ca	am Elemen 35A / Low Ea apability	t (Number/ arth Orbit (L	Name) .EO)	Project (N BX7 / Low Capability	: (Number/Name) ow Earth Orbit (LEO) Satellite lity		
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
BX7: Low Earth Orbit (LEO) Satellite Capability	-	0.000	0.000	22.678	-	22.678	19.881	18.084	27.175	15.986	0.000	103.804
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year (FY) 2021, Project BX7 Low Earth Orbit (LEO) Satellite Capability transitioned from Program Element (PE) 1206308A, Project FE5 Space And Missile Defense Integration.

A. Mission Description and Budget Item Justification

The US Army Tactical Space Strategy provides Tactical Land Component Forces with space capabilities required to enable force projection and maneuver during Multi-Domain Operations. US Army space-based sensors will integrate with commercial and national systems to provides resilient communications, assured PNT and deep sensing capabilities required in the targeting process to enable rapid and responsive sensor-to-shooter applications required to engage and defeat Anti-Access/Area Denial (A2/AD) forces and enable force projection and maneuver in contested Multi-Domain Operations

The LEO Satellite Capability will provide prototyping, development and experimentation of the Tactical Space Layer (TSL) sensors which are designed to provide widearea, responsive deep area sensing required for beyond line of sight (BLOS) targeting and force maneuver, significantly reducing Sensor to Shooter (S2S) timelines. Follow-on persistent prototype tactical sensor capabilities will be operational in FY 2021/2022 and will be integrated with the Army Tactical Intelligence Targeting Access Node (TITAN) ground station to tactically task, receive and disseminate data to directly support live-fire S2S demonstrations and assessments.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021				
Title: LEO Satellite Capability	-	-	17.678				
Description: A dedicated constellation of small satellites to provide resilient, persistent LEO capability to address shortfalls in current reconnaissance, surveillance, and target acquisition (RSTA) and PNT systems. Provides the ability to identify and locate targets of interest in denied and contested environments actionable to the tactical warfighter. This includes the Battle Management, Command and Communication (BMC2) capability required to task payloads and fuse data, as well as algorithms to enhance, analyze, and disseminate this data to the tactical warfighter via existing Army systems and networks in support of Sensor-to-Shooter demonstrations directly supporting Long Range Precision Fires (LRPF).							
Appropriation/Budget Activity R- 2040 / 4 PE Sa Sa B. Accomplishments/Planned Programs (\$ in Millions)	-1 Program Element (Number/Name) E 0604035A / Low Earth Orbit (LEO) atellite Capability	Project (Number/	Name)				
--	--	------------------	---------	---------	--	--	--
B Accomplishments/Planned Programs (\$ in Millions)	Appropriation/Budget Activity R-1 Program Element (Number/Name) Program Element (Number/Name) 2040 / 4 PE 0604035A / Low Earth Orbit (LEO) BX7 Satellite Capability Cap						
<u>B. Accomptionmento/inamica i regrano (@ in minono/</u>		FY 2019	FY 2020	FY 2021			
Begin validation of demonstration constellation in a realistic operational environme and communications technologies to identify and locate targets of interest in denie tactical warfighter.	ent. Evaluate the integrated RSTA, PNT, BN ed and contested environments actionable t	1C2, o the					
FY 2020 to FY 2021 Increase/Decrease Statement: All FY 2020 adjustments align program financial structure to Army Modernization F Strategy. Work in this Project complements and is fully coordinated with PE 63346 consistent with the Under Secretary of Defense for Research and Engineering prior Strategy. Work in this Project is performed by the United States Army Space and F Strategic Command in Huntsville, AL. FY 2020 realignments are due to financial re Priorities.	Priorities in support of the National Defense 63 (Tag, Track and Locate). The cited work ority focus areas and the Army Modernization Missile Defense Command/Army Forces restructuring in support of Army Modernization	is in on					
Title: APNT Integrated Space Communications		-	-	5.000			
Description: Development of a unique advanced space communications capabilit communications technologies and concepts utilizing bi-static Radio Frequency (RI frequency, phase, and power management. This space communications capability advanced Army LEO space communications concepts and will also assess interface communication missions	ity to explore advanced ground based space F) scattering and propagation with precision y will develop and demonstrate multiple acing with multiple Joint Service space						
FY 2021 Plans: Assess performance of space communications capabilities of multiple advanced A interfacing with multiple Joint Services.	Army LEO space communications concepts	and					
FY 2020 to FY 2021 Increase/Decrease Statement: All FY 2020 adjustments align program financial structure to Army Modernization F Strategy. Work in this Project complements and is fully coordinated with PE 63346 consistent with the Under Secretary of Defense for Research and Engineering prior Strategy. Work in this Project is performed by the United States Army Space and F Strategic Command in Huntsville, AL. FY 2020 realignments are due to financial re Priorities.	Priorities in support of the National Defense 63 (Tag, Track and Locate). The cited work ority focus areas and the Army Modernization Missile Defense Command/Army Forces restructuring in support of Army Modernization	is in on					
Ac	ccomplishments/Planned Programs Subt	otals -	-	22.678			

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604035A <i>I Low Earth Orbit (LEO)</i> <i>Satellite Capability</i>	Project (Number/Name) BX7 I Low Earth Orbit (LEO) Satellite Capability
C. Other Program Funding Summary (\$ in Millions)		
<u>Remarks</u>		
D. Acquisition Strategy		
N/A		

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Program Element (Number/Name)Project (NPE 0604035A / Low Earth Orbit (LEO)BX7 / LowSatellite CapabilityCapability						(Number/Name) ow Earth Orbit (LEO) Satellite ity			
Management Service	es (\$ in M	illions)		FY 2019		FY	2020	FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Award Cost Date		Cost	Award Date	Cost	Award Date	Award Cost Date		Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix Gov/SETA Support LEO	TBD	Multiple : Multiple Locations	-	-		-		3.000	Oct 2020	-		3.000	0.000	3.000	Continuing
Matrix Gov/SETA Support APNT Integrated Space Communications	TBD	Multiple : Multiple Locations	-	-		-		1.000	Oct 2020	-		1.000	0.000	1.000	Continuing
Subtotal						-		4.000		-		4.000	0.000	4.000	N/A
Product Developmen	nt (\$ in Mi	illions)		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
LEO Satellite Capability	Various	Multiple : Multiple	-	-		-		14.678	Feb 2021	-		14.678	0.000	14.678	Continuing
APNT Integrated Space Communications	MIPR	Classified : Classified	-	-		-		4.000	Jan 2021	-		4.000	0.000	4.000	Continuing
		Subtotal	-	-		-		18.678		-		18.678	0.000	18.678	N/A
Prior Years			FY	FY 2019		2020	FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
		Project Cost Totals	-	-		0.000		22.678		-		22.678	0.000	22.678	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021	Army				Date: February	2020	
Appropriation/Budget Activity 2040 / 4		R- PE Sá	1 Program Elemen E 0604035A <i>I Low E</i> atellite Capability	Number/Name) v Earth Orbit (LEO) Satellite v			
Г							
Event Name	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
LEO Satellite Capability							
APNT Integrated Space Communications							
				· · · ·			

HIDI R-4A, RDT&E Schedule Details: PB 2021 Anny	Date:	Date: February 2020		
propriation/Budget Activity R-1 Program 40 / 4 PE 0604035 Sate/lite Cap	n Element (Number A I Low Earth Orbit (ability	r/ Name) (LEO)	Project (Number BX7 / Low Earth Capability	r/Name) Orbit (LEO) Satellite
Schedule Deta	ils			
	Sta	art		End
Events	Sta Quarter	art Year	Quarte	End r Year
Events LEO Satellite Capability	State Quarter 1	art Year 2022	Quarter 4	End r Year 2025

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army											Date: February 2020		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0604100A / Analysis Of Alternatives								
COST (\$ in Millions)	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost				
Total Program Element	10.082	-	10.082	10.216	10.418	10.754	10.864	0.000	71.753				
EC7: Analysis Of Alternatives	10.082	-	10.082	10.216	10.418	10.754	10.864	0.000	71.753				

A. Mission Description and Budget Item Justification

This Program Element (PE) provides funding for analytical support of Analysis of Alternatives. Analyses of Alternatives are statutory requirements for Major Defense Acquisition Programs and regulatory for all other programs. Based on Department of Defense Instruction (DoDI) 5000.02, Analyses of Alternatives are required to be completed for a new start program prior to its first Milestone Decision. The PE provides analytical capability for Pre-Milestone A programs that emerge outside the normal budget or POM cycles. Normally these programs are without program managers and require analysis to support Congressional, Defense and Army Senior Leader's requirement and acquisition needs and priorities. The Analyses of Alternatives support the preparation of the Capability Development Document, Key Performance Parameters and Thresholds values and tradeoff analysis. The cited work is consistent with the Army Futures Command Science and Technology priority focus areas and the Army Modernization Strategy and Guidance. Work in this PE is performed by analytical agencies such as The Research and Analysis Center and Data and Analysis Center. The Army is projecting to start work on multiple Analyses of Alternatives beginning in Fiscal Year 2021 (FY21), and will assess and fund the highest Congressional, Defense and Army Senior Leader's priorities during the year of execution.

<u>3. Program Change Summary (\$ in Millions)</u>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	9.753	10.023	10.092	-	10.092
Current President's Budget	9.396	10.023	10.082	-	10.082
Total Adjustments	-0.357	0.000	-0.010	-	-0.010
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-	-			
 SBIR/STTR Transfer 	-0.357	-			
 Adjustments to Budget Years 	-	-	-0.010	-	-0.010

Exhibit R-2A, RDT&E Project Ju		Date: February 2020												
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)FPE 0604100A / Analysis Of AlternativesE					Project (Number/Name) EC7 / Analysis Of Alternatives			
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		
EC7: Analysis Of Alternatives	-	9.396	10.023	10.082	-	10.082	10.216	10.864	0.000	71.753				
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				

A. Mission Description and Budget Item Justification

This Project provides funding for analytical support of Analysis of Alternatives. Analyses of Alternatives are statutory requirements for Major Defense Acquisition Programs and regulatory for all other programs. Based on Department of Defense Instruction (DoDI) 5000.02, Analyses of Alternatives are required to be completed for a new start program prior to its first Milestone Decision. The Project provides analytical capability for Pre-Milestone A programs that emerge outside the normal budget or POM cycles. Normally these programs are without program managers and require analysis to support Congressional, Defense and Army Senior Leader's requirement and acquisition needs and priorities. The Analyses of Alternatives support the preparation of the Capability Development Document, Key Performance Parameters and Thresholds values and tradeoff analysis. The cited work is consistent with the Army Futures Command Science and Technology priority focus areas and the Army Modernization Strategy and Guidance. Work in this Project is performed by analytical agencies such as The Research and Analysis Center and Data and Analysis Center. The Army is projecting to start work on multiple Analyses of Alternatives beginning in Fiscal Year 2021 (FY21) and will assess and fund the highest Congressional, Defense and Army Senior Leader's priorities during the year of execution.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Analysis of Alternatives	9.396	9.567	10.082
Description: This Project provides funding for analytical support for the following efforts:			
FY 2020 <i>Plans:</i> FY 2020 funding supports analysis for new start programs that do not yet have a program manager assigned and to augment program manager funds where requirement decisions drive changes in scope or increased fidelity to achieve Congressional, Defense and Army Senior Leaders priority intent and interest. The analysis initiation, scope, and fidelity are determined in accordance with U.S. Army Future Command processes prior to the Materiel Development Decision and synchronized to support Joint and Army Requirement Oversight Councils' (JROC and AROC) and Acquisition Executive/Program decisions. Current projections indicate multiple new start programs will need to start their Analysis of Alternatives in FY 2020, including Unified Network Operations, Terrain Shaping Obstacles, Aircraft Survivability Equipment, Next Generation Aerial ISR/MDSS, Maneuver Short Range Air Defense, Assured Positioning, Navigation Timing, Precision Strike Missile, Terrestrial Layer Intelligence Support for Multi-Domain Battle/Joint Combined Army Maneuver, Robotic Combat Vehicle, and Future Tactical Unmanned Aircraft System. In addition, several Analyses of Alternatives started in FY 2019 will continue to require analysis funding into FY 2020, to include Next Generation Combat Vehicle, Optionally Manned Fighting Vehicle, and Future Vertical Lift, Future Attack Recon Aircraft Capability Set 1. In the Spring of 2020 (on or about 1 May) we can provide, as desired, the Committee an updated listing of projected FY 2020 new start program Analyses of Alternatives.			
FY 2021 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604100A <i>I Analysis Of Alternatives</i>	Project (EC7 / An	Number/N alysis Of A	lame) Alternatives	
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2019	FY 2020	FY 2021
FY 2021 funding supports analysis for new start programs that do not yet have program manager funds where requirement decisions drive changes in scope of Defense and Army Senior Leader's priority intent and interest. The analysis init accordance with the U.S. Army Future Command processes prior to the Materi support Joint and Army Requirement Oversight Councils (JROC and AROC) ar	a program manager assigned and to augmen or increased fidelity to achieve Congressional iation, scope, and fidelity are determined in el Development Decision and synchronized to nd Acquisition Executive/Program decisions.	nt , D			
FY 2020 to FY 2021 Increase/Decrease Statement: Funding change reflects planned lifecycle of this effort.					
Title: FY 2020 SBIR/STTR Transfer			-	0.456	-
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 Sul	ototals	9.396	10.023	10.082
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					
<u>D. Acquisition Strategy</u> N/A					

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budg 2040 / 4	et Activit	у				R-1 Pro PE 060	ogram Ele 4100A / A	ement (N A <i>nalysis</i> C	umber/N Of Alterna	ame) tives	Project EC7 / A	t (Numbe Analysis C	r/Name) of Alternati	ves	
Management Servic	es (\$ in N	lillions)		FY	2019	FY 2	2020	FY 2 Ba	2021 se	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	-	-		0.456		-		-		-	0.000	0.456	-
		Subtotal	-	-		0.456		-		-		-	0.000	0.456	N/A
Product Developme	Product Development (\$ in Millions)			FY	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2	2021 CO	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 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	0.357		-		-		-		-	0.000	0.357	-
		Subtotal	-	0.357		-		-		-		-	0.000	0.357	N/A
Support (\$ in Millior	ıs)			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 (Analysis of Alternative)	MIPR	TRADOC Analysis Center : Fort Leavenworth, KS	3.803	5.223		-		-		-		-	0.000	9.026	-
System Engineering (Analysis of Alternative)	MIPR	Army Materiel Systems Analysis Activity : Aberdeen Proving Ground, MD	3.504	3.816		-		-		-		-	0.000	7.320	-
Analytical Support for Analyses of Alternatives	MIPR	TBD : TBD	23.572	-		9.567		10.082		-		10.082	0.000	43.221	-
		Subtotal	30.879	9.039		9.567		10.082		-		10.082	0.000	59.567	N/A
			Prior Years	FY	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	30.879	9.396		10.023		10.082		-		10.082	0.000	60.380	N/A
Bomorko															

Remarks

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xhibit R-4, RDT&E Schedule Profile: PB 2021 Army Date: February 2020												
Appropriation/Budget Activity 2040 / 4			R-1 F PE 0	Program Elemen 604100A / Analys	t (Number/Name sis Of Alternatives	e) P 6 E	roject (N C7 I Ana	l umber/Name) lysis Of Alternativ	/es			
Event Name	FY 2019	FY 202	20	FY 2021	FY 2022	FY	2023	FY 2024	FY 2025			
Identify Candidates for FY19 AoA funding						I		· · ·				
Issue FY19 AoA Funding												
Identify Candidates for FY20 AoA funding			•									
Issue FY 20 AoA Funding												
Identify Candidates for FY21 AoA funding												
Issue FY 21 AoA Funding												
Identify Candidates for FY22 AoA funding												
Issue FY 22 AoA Funding												

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Feb	ruary 2020			
Appropriation/Budget Activity 040 / 4	R-1 Program PE 0604100A	Element (Numbe I Analysis Of Alte	er/Name) I rnatives I	Project (Number/Name) EC7 I Analysis Of Alternatives			
	Schedule Detail	S					
		St	art	E	nd		
Events		Quarter	Year	Quarter	Year		
Identify Candidates for FY19 AoA funding		4	2018	3	2019		
Issue FY19 AoA Funding		1	2020	4	2020		
Identify Candidates for FY20 AoA funding		4	2019	3	2020		
Issue FY 20 AoA Funding		1	2020	4	2020		
Identify Candidates for FY21 AoA funding		4	2020	3	2021		
Issue FY 21 AoA Funding		1	2021	4	2021		
Identify Candidates for FY22 AoA funding		4	2021	3	2022		
Issue FY 22 AoA Funding		1	2022	4	2022		

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army											Date: February 2020		
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P) Prior					R-1 Program Element (Number/Name) PE 0604101A I Small Unmanned Aerial Vehicle (SUAV) (6.4)							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	P1 FY 2021 FY 2021 Cost To 0CO Total FY 2022 FY 2023 FY 2024 FY 2025 Complete							Total Cost	
Total Program Element	-	0.000	0.000	1.378	-	1.378	1.387	1.392	1.753	1.786	Continuing	Continuing	
BR6: Small Unmanned Aircraft System (6.4)	1.378	-	1.378	1.387	1.392	1.753	1.786	Continuing	Continuing				

Note

Funding has been moved to Program Element (PE) 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) from PE 0305232A Project RA7 RQ-11 UAV starting in FY 2021.

A. Mission Description and Budget Item Justification

The Rucksack Portable Unmanned Aircraft System (RPUAS) Family of Small Unmanned Aircraft System (FoSUAS) provides battalion and below ground maneuver elements with critical situational awareness and enhanced force protection. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. Other compatible receivers, such as the One System Remote Video Terminal and appropriately equipped manned platforms may also receive the FoSUAS products.

The RPUAS FoSUAS provides the battalion and below ground maneuver elements with an organic, on-demand, asset to develop situational awareness, enhance force protection, and secure routes, points, and areas. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. The RPUAS FoSUAS includes a combination of three separate hand-launched mission specific configurable aircraft that do not require an improved launch/recovery. The three separate mission specific configurable Unmanned Aircraft (UA) are the Short Range Reconnaissance (SRR), the Medium Range Reconnaissance (MRR), and the Long Range Reconnaissance (LRR). In addition to the aircraft, the system contains ground control equipment, which includes an interoperable handheld ground control station (H-GCS) which incorporates the Tactical Open Government Owned Architecture (TOGA). FoSUAS will utilize existing RQ-11 in a system of systems fielding concept, with SRR and LRR options under development.

Justification: FY 2021 Research, Development, Test, and Evaluation (RDT&E) Base funding of \$1.379 million for Program Management Engineering support and to meet Capabilities Production Document (CPD) Increment II Block II related requirements. Specifically, to conduct advanced component development activities for SRR and LRR and efforts to evaluate LRR prototype systems in high fidelity and realistic operating environments.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Ar	my			Date:	February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA Component Development & Prototypes (ACD&P)	4: Advanced	R-1 Program El PE 0604101A / S	ement (Number/Name) Small Unmanned Aerial	Vehicle (SUAV) (6.4)	
B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	1.378	-	1.378
Total Adjustments	0.000	0.000	1.378	-	1.378
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	1.378	-	1.378

Change Summary Explanation

Funding has been moved to PE 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) from PE 0305232A Project RA7 RQ-11 UAV starting in FY 2021.

Exhibit R-2A, RDT&E Project Ju		Date: February 2020										
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0604101A I Small Unmanned Aerial Vehicle (SUAV) (6.4)Project (N BR6 I Small 					lumber/Name) all Unmanned Aircraft 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
BR6: Small Unmanned Aircraft System (6.4)	-	0.000	0.000	1.378	-	1.378	1.387	1.392	1.753	1.786	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Funding has been moved to Program Element (PE) 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) from PE 0305232A Project RA7 RQ-11 UAV starting in FY 2021.

A. Mission Description and Budget Item Justification

The Family of Small Unmanned Aircraft System (FoSUAS) provides battalion and below ground maneuver elements with critical situational awareness and enhanced force protection. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. Other compatible receivers, such as the One System Remote Video Terminal and appropriately equipped manned platforms may also receive the FoSUAS products.

The Rucksack Portable Unmanned Aircraft Systems (RPUAS) FoSUAS provides the battalion and below ground maneuver elements with an organic, on-demand, asset to develop situational awareness, enhance force protection, and secure routes, points, and areas. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. The RPUAS FoSUAS includes a combination of three separate hand-launched mission specific configurable aircraft that do not require an improved launch/recovery. The three separate mission specific configurable Unmanned Aircraft (UA) are the Short Range Reconnaissance (SRR), the Medium Range Reconnaissance (MRR), and the Long Range Reconnaissance (LRR). In addition to the aircraft, the system contains ground control equipment, which includes an interoperable handheld ground control station (H-GCS) which incorporates the Tactical Open Government Owned Architecture (TOGA). FoSUAS will utilize existing RQ-11 in a system of systems fielding concept, with SRR and LRR options under development.

Justification: FY 2021 Research, Development, Test, and Evaluation (RDT&E) Base funding of \$1.723 million for Program Management Engineering support and to meet Capabilities Production Document (CPD) Increment II Block II related requirements. Specifically, to conduct advanced component development activities for SRR and LRR and efforts to evaluate LRR prototype systems in high fidelity and realistic operating environments.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Component Development and Integration	-	-	0.542
Description: Engineering to develop and integrate new components into SRR and engineering to develop new components for LRR.			
FY 2021 Plans:			

Exhibit R-2A, RDT&E Project Jus	tification: PB	2021 Army							Date: Fe	bruary 2020	
Appropriation/Budget Activity 2040 / 4				R-1 Pi PE 06 <i>Vehicl</i>	r ogram Eler 04101A / Sn e (SUAV) (6	nent (Numb nall Unmann .4)	er/Name) ed Aerial	Project BR6 / <i>Sr</i> (6.4)	(Number/Na mall Unmanr	a me) ned Aircraft S	System
B. Accomplishments/Planned Pro	ograms (\$ in N	<u>/lillions)</u>						I	FY 2019	FY 2020	FY 2021
Advanced component development	t efforts for LRI	R and SRR.									
FY 2020 to FY 2021 Increase/Dec Funding has been moved to PE 060 UAV starting in FY 2021.	rease Stateme 04101A Small	ent: Unmanned /	Aerial Vehicl	e (SUAV) (6	.4) from PE	0305232A P	roject RA7 F	Q-11			
Title: System Engineering Program	n Management								-	-	0.136
Description: System Engineering I vehicles and engineering to develop	Program Mana p new compon	gement sup ents for LRF	port during c २	levelopment	and integra	tion of comp	onents for SI	RR air			
FY 2021 Plans: System Engineering and Program I	Management s	upport of ad	vanced com	ponent deve	elopment act	ivities for LR	R and SRR.				
FY 2020 to FY 2021 Increase/Dec Funding has been moved to PE 060 UAV starting in FY 2021.	rease Stateme 04101A Small	ent: Unmanned /	Aerial Vehicl	e (SUAV) (6	.4) from PE	0305232A P	roject RA7 F	Q-11			
Title: System Test and Evaluation									-	-	0.700
Description: Testing to Evaluate co	omponents for	the LRR an	d SRR air ve	ehicles.							
FY 2021 Plans: Testing to evaluate efforts to develo	op and integrat	e componer	nts for LRR a	and SRR air	vehicles.						
FY 2020 to FY 2021 Increase/Dec Funding has been moved to PE 060 UAV starting in FY 2021.	rease Statem 04101A Small	ent: Unmanned /	Aerial Vehicl	e (SUAV) (6	.4) from PE	0305232A P	roject RA7 F	Q-11			
				Accon	nplishment	s/Planned P	rograms Su	btotals	-	-	1.378
C. Other Program Funding Summ	nary (\$ in Milli	ons <u>)</u>									
		-	FY 2021	FY 2021	<u>FY 2021</u>					Cost To	
Line Item	FY 2019	FY 2020	Base	000	<u>Total</u>	<u>FY 2022</u>	FY 2023	<u>FY 2024</u>	<u>FY 2025</u>	<u>Complete</u>	Total Cost
• RA7: RQ-11 Raven (MIP)	6.180	3.218	0.000	-	0.000	-	6 200	-	-	Continuing	Continuing
Aircraft System (6.5)	-	-	5.999	-	5.999	2.407	0.302	9.009	3.018	Continuing	Continuing
• A00010: RQ-11 (RAVEN)	46.438	21.420	20.851	-	20.851	16.397	16.581	21.342	21.560	Continuing	Continuing

PE 0604101A: Small Unmanned Aerial Vehicle (SUAV) (6.... Army

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Exhibit R-2A, RDT&E Project J	ustification: PB	2021 Army					Date: February 2020				
Appropriation/Budget Activity 2040 / 4		R-1 Pr PE 060 <i>Vehicle</i>	r ogram Ele r 04101A / Sn e (SUAV) (6.	nent (Numb nall Unmann 4)	Number/Name) nall Unmanned Aircraft System						
C. Other Program Funding Sur	nmary (\$ in Milli	ons <u>)</u>									
<u>Line Item</u> Remarks	<u>FY 2019</u>	FY 2020	<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> Complete	<u>Total Cost</u>

Funding has been moved to PE 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) from PE 0305232A Project RA7 RQ-11 UAV starting in FY 2021.

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Arm	iy								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Program Element (Number/Name)ProjectPE 0604101A / Small Unmanned AerialBR6 /Vehicle (SUAV) (6.4)(6.4)						Project (Number/Name) BR6 I Small Unmanned Aircraft System 6.4)			
Management Service	es (\$ in M	illions)		FY	2019	FY 2020		FY : Ba	2021 ase	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	TBD	To Be Determined : To Be Determined	-	-		-		0.136		-		0.136	Continuing	Continuing	Continuing
		Subtotal	-	-		-		0.136		-		0.136	Continuing	Continuing	N/A
Product Developme	nt (\$ in M	illions)		FY	2019	FY	2020	FY : Ba	2021 ase	FY 2	2021 CO	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
Component development and Integration	TBD	To Be Determined : To Be Determined	-	-		-		0.542	Jun 2021	-		0.542	Continuing	Continuing	Continuing
		Subtotal	-	-		-		0.542		-		0.542	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ions)		FY	2019	FY	2020	FY	2021 ase	FY 2	2021 CO	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 Test and Evaluation	TBD	To Be Determined : To Be Determined	-	-		-		0.700	Aug 2021	-		0.700	Continuing	Continuing	Continuing
		Subtotal	-	-		-		0.700		-		0.700	Continuing	Continuing	N/A
			Prior Years	FY	2019	FY	2020	FY : Ba	2021 ase	FY : Of	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals				0.000 1.378			-		1.378	Continuing	Continuing	N/A			
Pomarks															

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021	Army							Date: Fe	bruary	2020	
Appropriation/Budget Activity 2040 / 4	F	R-1 Pro PE 0604 Vehicle	gram Elemer 101A / Small (SUAV) (6.4)	nt (Number/Name Unmanned Aeria	Project (N BR6 / Sm (6.4)	t (Number/Name) Small Unmanned Aircraft System					
	EV 2019	EV 202	20	EV 2021	EV 2022	F	V 2023	EV 2	024	EV 2	025
Event Name	1 2 3 4	1 2 3	4 1	2 3 4	1 2 3 4	1 2	3 4	1 2	3 4	1 2	3 4
Systems Engineering Program Management (SEPM)	SEPM										
SRR Tranche I OTA Award	SRR Tranche I C	та									
SRR Tranche I Prototyping	SRR Tranche I Prototypes	\$									
Test and Evaluation	TE										
SRR/HGCS Integration	SRR/HGCS Int										
SRR Tranche I End User Assessment		2 SRR Tre	anche I EUA								
SRR Tranche I Full Rate Production (FRP) Decision		SF	3 RR Tranche	I MS-C FRP							
SRR Tranche II OTA Award				SRR Tranche	ΙΟΤΑ						
SRR Tranche II Prototyping				SRR Tr	anche II Prototypes						
SRR Tranche II End User Assessment					5 SRR Tranche II EUA						
SRR Tranche II FRP Decision					6 SRR Tranche I	FRP					
SRR Tranche III					SRR Tra	nche III					
LRR OTA Award (Component)				LRR OTA							



Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febr	uary 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program I PE 0604101A <i>Vehicle (SUAV</i>	Element (Numbe I Small Unmanne ') (6.4)	Project (Number/Name) BR6 / Small Unmanned Aircraft System (6.4)		
	Schedule Details	5			
	[Si	tart	E	nd
Events		Quarter	Year	Quarter	Year
Tactical Open Government Owned Architecture Development		4	2014	4	2014
Tactical Open Government Architecture Test Event 2		3	2015	3	2015
Systems Engineering Program Management (SEPM)		2	2018	4	2024
SRR Tranche I OTA Award		3	2019	3	2019
SRR Tranche I Prototyping		3	2018	4	2019
Test and Evaluation		4	2018	4	2024
SRR/HGCS Integration		2	2018	4	2020
SRR Tranche I End User Assessment		3	2020	3	2020
SRR Tranche I Full Rate Production (FRP) Decision		4	2020	4	2020
SRR Tranche II OTA Award		3	2021	3	2021
SRR Tranche II Prototyping		3	2021	3	2022
SRR Tranche II End User Assessment		2	2022	2	2022
SRR Tranche II FRP Decision		3	2022	3	2022
SRR Tranche III		3	2022	2	2024
LRR OTA Award (Component)		3	2021	3	2022
LRR Prototyping (System)		3	2022	1	2025
LRR/HGCS Integration		3	2022	3	2024
LRR End User Assessment		3	2024	3	2024
LRR FRP Decision		2	2025	2	2025

Note

Funding has been moved to this PE 0305232A Project RA7 RQ-11 UAV starting in FY 2021.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army											Date: February 2020		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P) Prior					R-1 Program Element (Number/Name) PE 0604113A / Future Tactical Unmanned Aircraft System (FTUAS)								
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 FY 2021 FY 2021 FY 2022 FY 2023 FY 2024 FY 2024 <t< th=""><th>Cost To Complete</th><th>Total Cost</th></t<>						Cost To Complete	Total Cost	
Total Program Element	-	12.393	40.745	40.083	-	40.083	45.239	40.922	38.264	8.993	Continuing	Continuing	
EX8: Future Unmanned Aircraft System (FUAS)	40.083	-	40.083	45.239	40.922	38.264	8.993	Continuing	Continuing				

A. Mission Description and Budget Item Justification

The Future Unmanned Aircraft System (FUAS) is a critical system in the Multi-Domain Operations (MDO) concept that will employ MDO capabilities at all echelons and allow ground based forces to project power from land into other domains to defeat highly capable enemies, secure terrain, and consolidate gains. FUAS encompasses an array of capabilities from platoon soldiers to Division Commanders. The Army Requirements Oversight Council (AROC) approved the FUAS Initial Capabilities Document (ICD) on 6 Mar 2019. The FUAS ICD includes requirements for Future Tactical UAS (FTUAS), Air Launched Effects (ALE), and Scalable Control Interface (SCI). Manned, optionally-manned, and unmanned systems will penetrate defense-in-depth environments by employing ALE with teaming and swarming effects to detect, decoy, jam radar and communications, conduct cyber-attack, spoof and jam Global Positioning System (GPS), and kinetic engagement.

The Future Vertical Lift Cross Functional Team (FVL CFT) FUAS line of effort is comprised of multiple components including the FTUAS for the Brigade Combat Team (BCT), and ALE. The FTUAS seeks to replace the RQ-7Bv2 Shadow assets within the BCTs. Key attributes of the FTUAS BCT focus on Rapid Deployability, Expeditionary Maneuver, and Mobility for adaptive and agile operations. FTUAS will consist of an aircraft subsystem that will include the airframe, propulsion, avionics, communications, navigation, and software systems; aircraft-specific ground support equipment including power generation, transportation, or command and control equipment; aircraft software; and required engineering, logistics, programmatic support. ALE extends tactical and operational reach, lethality, and protection to the advanced team as an attritable or optionally recoverable aerial capability that detects, identifies, locates, and reports threats; represents a credible decoy; disrupts threat communication, targeting and acquisition systems; and delivers lethal and non-lethal effects against those threats across Multi-Domain Operations.

Justification: Fiscal Year (FY) 2021 FTUAS Research Development Technology & Evaluation (RDT&E) Base funding of \$40.122 million will be utilized for the following: 1) \$16.797 million to support the FTUAS early development, 2) \$20.000 million to support ALE Systems Analysis, 3) \$3.325 million provides Systems Engineering and Program Management (SEPM) to support FTUAS.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Ar	my			Date:	February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA Component Development & Prototypes (ACD&P)	4: Advanced	R-1 Program El PE 0604113A / F	ement (Number/Name) Future Tactical Unmanne	ed Aircraft System (FT	UAS)
B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	12.393	40.745	20.122	-	20.122
Current President's Budget	12.393	40.745	40.083	-	40.083
Total Adjustments	0.000	0.000	19.961	-	19.961
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-10.000			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	10.000			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	19.961	-	19.961

Change Summary Explanation

FY 2021 FTUAS Research Development Technology & Evaluation (RDT&E) Base funding of \$40.122 million will be utilized for the following: 1) \$16.797 million to support the FTUAS early development, 2) \$20.000 million to support ALE Systems Analysis, 3) \$3.325 million provides SEPM to support FTUAS.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060411 Aircraft Sys	am Elemen 3A / Future stem (FTUA	umber/Nan re Unmanne	er/Name) nmanned Aircraft 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
EX8: Future Unmanned Aircraft System (FUAS)	-	12.393	40.745	40.083	-	40.083	45.239	40.922	38.264	8.993	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Future Unmanned Aircraft System (FUAS) is a critical system in the Multi-Domain Operations (MDO) concept that will employ MDO capabilities at all echelons and allow ground based forces to project power from land into other domains to defeat highly capable enemies, secure terrain, and consolidate gains. FUAS encompasses an array of capabilities from platoon soldiers to Division Commanders. The Army Requirements Oversight Council (AROC) approved the FUAS Initial Capabilities Document (ICD) on 6 Mar 2019. The FUAS ICD includes requirements for Future Tactical UAS (FTUAS), Air Launched Effects (ALE), and Scalable Control Interface (SCI). Manned, optionally-manned, and unmanned systems will penetrate defense-in-depth environments by employing ALE with teaming and swarming effects to detect, decoy, jam radar and communications, conduct cyber-attack, spoof and jam Global Positioning System (GPS), and kinetic engagement.

The Future Vertical Lift Cross Functional Team (FVL CFT) FUAS line of effort is comprised of multiple components including the FTUAS for the Brigade Combat Team (BCT), and ALE. The FTUAS seeks to replace the RQ-7Bv2 Shadow assets within the BCTs. Key attributes of the FTUAS BCT focus on Rapid Deployability, Expeditionary Maneuver, and Mobility for adaptive and agile operations. FTUAS will consist of an aircraft subsystem that will include the airframe, propulsion, avionics, communications, navigation, and software systems; aircraft-specific ground support equipment including power generation, transportation, or command and control equipment; aircraft software; and required engineering, logistics, programmatic support. ALE extends tactical and operational reach, lethality, and protection to the advanced team as an attritable or optionally recoverable aerial capability that detects, identifies, locates, and reports threats; represents a credible decoy; disrupts threat communication, targeting and acquisition systems; and delivers lethal and non-lethal effects against those threats across Multi-Domain Operations.

Justification: Fiscal Year (FY) 2021 FTUAS Research Development Technology & Evaluation (RDT&E) Base funding of \$40.122 million will be utilized for the following: 1) \$16.797 million to support the FTUAS early development, 2) \$20.000 million to support ALE Systems Analysis, 3) \$3.325 million provides Systems Engineering and Program Management (SEPM) to support FTUAS.

FY 2019	FY 2020	FY 2021
10.800	18.079	-
	FY 2019 10.800	FY 2019 FY 2020 10.800 18.079

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020				
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604113A <i>I Future Tactical Unmanned</i> <i>Aircraft System (FTUAS)</i>	Project (Number/Name) EX8 I Future Unmanned Aircraft System (FUAS)					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021			
Funding was used for USARPAC MDTF Demonstration supports U/ FTUAS requirements.	AS aircraft, payload and MFEW demonstration which info	rms					
FY 2020 to FY 2021 Increase/Decrease Statement: Decrease to \$0 in FY 2021 due to FVL CFT direction to begin FTUA	AS early development.						
Title: Air Launched Effects (ALE) Systems Analysis		-	20.000	20.000			
Description: ALE systems analysis in preparation for a Materiel De PM will conduct market research, systems engineering analyses an materiel solution approaches are technically feasible and have the p operational attributes, and associated external dependencies.	velopment Decision (MDD), and to inform requirements. d conduct an assessment of how the proposed candidate potential to effectively address capability gaps, desired	The					
FY 2020 Plans: Funded ALE market research, early systems engineering analyses a through air vehicle and payload, and mission systems architecture of	and assessment of candidate materiel solution approach	es					
FY 2021 Plans: Continue to fund ALE Increment 1a demonstrations, engineering an material solution approaches in support of host platform integration. Systems Architecture and SCI required for ALE.	alysis, integration, prototyping, assessment of proposed Continue to support the development of the Modular Op	en					
Title: System Engineering/Program Management		1.593	2.666	3.325			
Description: SEPM							
FY 2020 Plans: Funded SEPM to support FTUAS pre-milestone decision requireme milestone documents.	nts such as independent cost estimates and other require	ed					
FY 2021 Plans: Funding to continue SEPM to support FUAS milestone decision req	uirements.						
FY 2020 to FY 2021 Increase/Decrease Statement: Increase of \$0.659 million in FY 2021 required to support systems e	engineering and milestone decision requirements.						
Title: Future Tactical Unmanned Aircraft System (FTUAS)		-	-	16.758			

Exhibit R-2A, RDT&E Project Justi	fication: PB	2021 Army							Date: Fe	ebruary 2020	1
Appropriation/Budget Activity 2040 / 4				R-1 Pr PE 060 <i>Aircraf</i>	r ogram Ele 04113A <i>I Fu</i> ft System (F	nent (Numb iture Tactical TUAS)	er/Name) Unmanned	Proje EX8 / (FUAS	ct (Number/N Future Unmai S)	ame) nned Aircraft	System
B. Accomplishments/Planned Prog	grams (\$ in N	<u>/lillions)</u>							FY 2019	FY 2020	FY 2021
Description: This is a New Effort in aircraft that provides the Brigade Con improved target location and designation and des	FY 2021. Th mbat Teams ation.	e FTUAS pla with expedition	atform is inte onary, intelli	ended to be a gence, surve	a runway ind eillance, and	lependent G I reconnaissa	roup 2/3 unn ance (ISR) w	nanned ⁄ith			
FY 2021 Plans: Funds will development / integration Scalable Control Interface (SCI), an	of required F d Tactical Da	TUAS compo ta Link).	onents (Mini	iaturized Typ	be 1 Encrypt	ion, Miniatur	ized Mode 5	/S IFF,			
FY 2020 to FY 2021 Increase/Decre Increase \$16.797 million in FY 2021	ease Stateme due to FVL C	ent: CFT direction	to begin FT	UAS early d	evelopment						
				Accom	nplishment	s/Planned P	rograms Su	ıbtotals	12.393	40.745	40.083
C. Other Program Funding Summa	<mark>ıry (\$ in Milli</mark>	<u>ons)</u>	<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>					<u>Cost To</u>	<u>!</u>
<u>Line Item</u> • A01310: <i>Tactical Unmanned</i> <i>Aircraft System (TUAS)</i>	<u>FY 2019</u> -	<u>FY 2020</u> 12.100	<u>Base</u> 1.101	<u>000</u> -	<u>Total</u> 1.101	<u>FY 2022</u> 25.345	<u>FY 2023</u> 38.100	<u>FY 202</u> 55.40	24 <u>FY 2028</u> 00 90.752	<u>Complete</u> 0.000	Total Cost 222.798
Remarks FY 2021 base procurement dollars in necessary to conclude the FTUAS D	n the amount Demonstratior	of \$1.101 m	illion suppor	ts the FVL C	FT FTUAS	Demonstrati	on: Specifica	ally, the F	Program Mana	igement (PM) support
<u>D. Acquisition Strategy</u> The Aviation Platform - Requiremen	ts Developme	ent Division (AP-RDD) pr	repared an Ir	nitial Capab	lities Docum	ent (ICD) tha	at was ap	proved by the	AROC on 6	Mar 2019.
The FVL CFT is overseeing a demo RQ-7Bv2 Shadow TUAS within the I Capability Development Document (nstration effor 3CT formation (CDD). A MD	rt in FY 2019 n. The Demo D review will	- 2021 that Instration efficience be held in F	will inform th fort will focus Y 2021.	ne FTUAS r s on conduc	equirement t ting analysis	o develop ca and obtainir	ipability t ng field d	hat will ultima ata that will in	tely replace t form the FTL	he IAS
AP-RDD - Prepared ALE Initial Capa	ability Refiner	ment Docume	ent (ICRD) t	hat was app	roved by GI	EN John M. N	/lurray, CG, /	AFC on 2	21 Oct 2019.		
The plan to acquire ALE is through a	an incrementa	al approach t	hat allows ra	apid prototyp	oing and fiel	ding of techn	ology to field	l availabl	e capabilities	while continu	uing S&T

Ine plan to acquire ALE is through an incremental approach that allows rapid prototyping and fielding of technology to field available capabilities while continuing S&I efforts to mature and transition emerging technologies to fully realize required capabilities. This is accomplished through multiple prototype development activities for the air vehicle, payloads, and mission system architecture through, experiments, simulations, and demonstrations conducted in parallel and/or sequential timelines. The objective of this incremental effort is to develop and exhibit multiple ALE prototypes to enable a rapid transition from prototype to operational implementation in the

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0604113A / Future Tactical Unmanned	EX8 I Futu	re Unmanned Aircraft System
	Aircraft System (FTUAS)	(FUAS)	

force. Increment 1A will be a COTS/GOTS system to enable technology maturation, systems integration, and potential initial capabilities. ALE program of record will be purpose built utilizing parallel efforts informed by S&T investments and information learned from the demonstration and testing of Increment 1A. Additional increments will leverage the mission system architecture, payload technologies and interfaces from the initial increment and seek to extend the range of ALE for missions in support of LRPF.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Aircraft	o gram El 4113A / F System (ement (N ⁻ uture Tac (FTUAS)	umber/N ctical Unn	ame) nanned	Project EX8 / F (FUAS)	t (Number Suture Unn	r/ Name) manned A	ircraft Sys	stem
Management Service	es (\$ in N	lillions)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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 Engineering and Program Management (SEPM)	Various	PM TUAS : Redstone Arsenal	-	1.593		2.666		3.325		-		3.325	Continuing	Continuing	-
	1	Subtotal	-	1.593		2.666		3.325		-		3.325	Continuing	Continuing	N/A
Product Developmer	nt (\$ in M	illions)		FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
Air Launched Effects (ALE) Systems Analysis	Various	PM TUAS : Redstone Arsenal	-	-		20.000		20.000		-		20.000	0.000	40.000	-
Future Tactical Unmanned Aircraft System (FTUAS)	Various	PM TUAS : Redstone Arsenal	-	-		-		16.758		-		16.758	0.000	16.758	-
		Subtotal	-	-		20.000		36.758		-		36.758	0.000	56.758	N/A
Support (\$ in Million	s)			FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
Multi Domain Task Force (MDTF) UAS Demonstration	Various	Various : Various	-	10.800		18.079		-		-		-	10.000	38.879	-
		Subtotal	-	10.800		18.079		-		-		-	10.000	38.879	N/A
			Prior Years	FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 O(2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	12.393		40.745		40.083		-		40.083	Continuing	Continuing	N/A
Remarks															



PE 0604113A: *Future Tactical Unmanned Aircraft System...* Army

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Exhibit R-4, RDT&E Schedule Profile: PB 2021.	Arm	/																		Da	te: I	Feb	ruary	2020	0		
propriation/Budget Activity 40 / 4								R-1 Program Element (Number/Name)Project (Number/Name)PE 0604113A / Future Tactical UnmannedEX8 / Future Unmanned AircAircraft System (FTUAS)(FUAS)								ircraf	t Sy	stem	1								
EventNeme		FY	(20	19		FY	202	20		FY	2021		F	FY 2	2022		FY 2023				FY	20	24		FY	202	5
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3 4	1	2	3	4	1	2	3	4	1	2	3	4
ALE Multi-Vendor Demonstrations								ALE	MV De	emo																	
ALE RFI 2										2		2															
ALE OTA 2														A	LE OTA 2												
ALE System Integration															ALE SI												
ALE RFP																		ALE	RFP								
ALE Milestone B																						ALE	MS B				
ALE Engineering and Manufacturing Development																						A	LE Eng	and Mfr	r Dev		
	•				•											•				•				•			

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army	Date: February 2020							
ppropriation/Budget Activity)40 / 4	R-1 Program PE 0604113A <i>Aircraft Syster</i>	Element (Numbe I Future Tactical m (FTUAS)	e r/Name) Unmanned	Project (Number/Name) EX8 I Future Unmanned Aircraft Sys (FUAS)				
	Schedule Detail	S						
		Si	tart	E	ind			
Events		Quarter	Year	Quarter	Year			
FTUAS Multi Domain Task Force Demonstration (MDTF)		1	2019	4	2020			
FTUAS System Engineering/Program Management (SEPM)		1	2019	4	2025			
FTUAS Demonstration (APA Funded)		3	2020	4	2021			
FTUAS Materiel Development Decision (MDD)		3	2021	3	2021			
FTUAS Milestone C		3	2022	3	2022			
FTUAS LRIP (APA Funded)		3	2022	2	2024			
FTUAS IOTE		3	2023	4	2023			
FTUAS FRP Decision		1	2024	1	2024			
FTUAS FRP (APA Funded)		1	2024	4	2028			
ALE RFI		2	2019	2	2019			
ALE A-CDD AROC		3	2020	3	2020			
ALE OTA 1		3	2020	3	2020			
ALE Technical Assessment		3	2020	2	2022			
ALE Multi-Vendor Demonstrations		4	2020	4	2021			
ALE RFI 2		3	2021	3	2021			
ALE OTA 2		3	2022	3	2022			
ALE System Integration		3	2022	1	2024			
ALE RFP		3	2023	3	2023			
ALE Milestone B		3	2024	3	2024			
ALE Engineering and Manufacturing Development		3	2024	3	2027			

Exhibit R-2, RDT&E Budget Item	I Justificat	i on: PB 202	21 Army							Date: Febr	uary 2020		
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	st & Evalua types (ACD	ation, Army 0&P)	/ BA 4: Adva	anced	R-1 Program Element (Number/Name) PE 0604114A <i>I Lower Tier Air Missile Defense (LTAMD) Sensor</i>								
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost	
Total Program Element	-	84.981	379.772	376.373	-	376.373	332.007	241.235	87.419	88.298	Continuing	Continuing	
EX2: Lower Tier Air Missile Defense (LTAMD) Capability	-	84.981	379.772	376.373	-	376.373	332.007	241.235	87.419	88.298	Continuing	Continuing	

A. Mission Description and Budget Item Justification

Lower Tier Air Missile Defense Sensor (LTAMDS) program will provide the required sensing capabilities, surveillance and fire control in the lower tier portion of the Army Integrated Air and Missile Defense (IAMD) of the ballistic missile defense battlespace. The acquisition program competitively selected the LTAMDS prime vendor in 1st Quarter (Q) Fiscal Year (FY) 2020 to build six Production Representative Unit sensors under the authority of Section 804 Rapid Prototyping. The sensor/radar set (RS) replaces the baseline PATRIOT RS (AN/MPQ-65A) in an IAMD enabled PATRIOT Battalion mitigating the risk associated with threat changes while also addressing growing obsolescence and increasing Operational & Support (O&S) cost. The LTAMDS capability addresses critical capability gaps, modernizes technology, and increases reliability and maintainability. The LTAMDS capability increases sensor/radar performance to maximize the inherent PATRIOT Advanced Capability (PAC-3) Missile Segment Enhanced (MSE) Interceptor capabilities to engage threats.

FY 2021 base dollars in the amount of \$376.373 million supports the acceleration of the Lower Tier Air and Missile Defense Sensor (LTAMDS) program. FY 2021 tasks include Production Representative Units manufacturing (purchase of 3 prototypes, final phase of Contractor Verification Testing and initial Government Developmental Testing and Qualification Testing events), acquiring targets, acquiring long lead items, Pre-Planned Product Improvements (P3I), and supporting programmatic and engineering activities needed to integrate the LTAMDS equipment with the Integrated Battle Command System, the PAC-3 Interceptor, and the Integrated Fire Control Network relay.

<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
89.248	427.772	376.738	-	376.738
84.981	379.772	376.373	-	376.373
-4.267	-48.000	-0.365	-	-0.365
-	-			
-	-48.000			
-	-			
-	-			
-	-			
-4.267	-			
-	-			
-	-	-0.365	-	-0.365
	FY 2019 89.248 84.981 -4.267 - - - - - - - - - - 4.267 - - - - - - - - - - - - - - - - - - -	FY 2019 FY 2020 89.248 427.772 84.981 379.772 -4.267 -48.000 - - - -48.000 - -	FY 2019 FY 2020 FY 2021 Base 89.248 427.772 376.738 84.981 379.772 376.373 -4.267 -48.000 -0.365 - - - <	FY 2019 FY 2020 FY 2021 Base FY 2021 OCO 89.248 427.772 376.738 - 84.981 379.772 376.373 - -4.267 -48.000 -0.365 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060411 Defense (L	am Elemen 4A / Lower .TAMD) Sen	t (Number/ Tier Air Mis sor	Project (N EX2 / Lowe (LTAMD) C	Number/Name) ver Tier Air Missile Defense Capability						
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
EX2: Lower Tier Air Missile Defense (LTAMD) Capability	-	84.981	379.772	376.373	-	376.373	332.007	241.235	87.419	88.298	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Lower Tier Air and Missile Defense Sensor (LTAMDS) satisfies the Warfighter's capability requirements in the Integrated Air and Missile Defense domain. The program provides the required sensing capabilities in the lower tier portion of the air and missile defense battlespace and expands the battlespace for the PATRIOT Advanced Capability (PAC-3) Missile Segment Enhancement (MSE) interceptor, and will be upgradable for the Future Interceptor. The Army Requirements Oversight Council (AROC) approved LTAMDS requirements in April 2016.

The Army competitively selected the LTAMDS, which will counter air and missile defense threats using state-of-the-art technology, while reducing operating and sustainment costs, mitigating obsolescence, and increasing reliability and maintainability.

LTAMDS Fiscal Year (FY) 2021 funding will be utilized for Production Representative Units manufacturing (final phase of Contractor Verification Testing and purchase of three prototypes), acquiring targets, acquiring long lead items, and supporting programmatic and engineering activities needed to integrate the LTAMDS equipment with the Integrated Battle Command System, the PAC-3 Interceptor, and the Integrated Fire Control Network relay. FY 2021 funding supports additional capabilities to meet full LTAMDS requirements, to include Pre-Planned Product Improvements (P3I). It further supports initial Government Developmental Testing and Qualification Testing events. FY 2021 activities support the FY 2018 National Defense Authorization Act (NDAA) requirement to accelerate LTAMDS Initial Operational Capability to no later than December 2023.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Lower Tier Missile Defense Sensor	84.981	362.526	376.373
Description: Provides the required sensing capabilities in the lower tier portion of the air and missile defense battlespace and expands the battlespace for the PAC-3 MSE interceptor.			
<i>FY 2020 Plans:</i> - Initiated LTAMDS prototype manufacture and integration activities - Conducted knowledge point and functional reviews of vendor prototypes - Initiated Contractor Verification Testing			
FY 2021 Plans: -Continue procurement of prototypes -Integration of LTAMDS with IAMD Battle Command System (IBCS)			

Exhibit R-2A, RDT&E Project Just	ification: PB	2021 Army							Date: F	ebruary 2020		
Appropriation/Budget Activity 2040 / 4				R-1 P PE 06 <i>Defen</i>	rogram Elei 604114A / Lo se (LTAMD)	ment (Numb wer Tier Air Sensor	Projec EX2 / (LTAN	ect (Number/Name) I Lower Tier Air Missile Defense MD) Capability				
B. Accomplishments/Planned Pro	grams (\$ in N	<u>/lillions)</u>						ſ	FY 2019	FY 2020	FY 2021	
-Acquisition of targets -Integration of LTAMDS with PAC-2 -Integration of LTAMDS with PAC-3 -Develop and integrate additional ca -Completion of Contractor Verificatio -Initiation of Development Testing -Initiation of Qualification Testing	Interceptor Family of Mis apabilities thro on Testing	siles ugh P3I effo	orts									
FY 2020 to FY 2021 Increase/Deci Realignment of funds in FY20 cost of Development Support was necessa of additional interceptors. Delta between budget years FY20 a	rease Statem categories Pro ry to support r and FY21 for L	ent: oduct Develo equirements .TAMDS (06	opment, Test s (MEP 810, 604114A) is l	/Planning/Ta Advanced T ess than 10	argets/Interc ⁻ hreat), addir %.	eptors, and F tional flight te	Product ests, and pur	rchase				
Title: FY 2020 SBIR/STTR Transfer	ſ								-	17.246	-	
Description: Funding transferred in	accordance	with Title 15	USC ?638									
FY 2020 Plans: Funding transferred in accordance v	with Title 15 U	SC ?638										
FY 2020 to FY 2021 Increase/Deci Funding transferred in accordance	r ease Statem with Title 15 U	ent: SC ?638										
				Accor	nplishment	s/Planned P	rograms Su	ubtotals	84.981	379.772	376.373	
C. Other Program Funding Summ	ary (\$ in Milli	ons <u>)</u>										
Line Item • C12101: Lower Tier Air and Missile Defense Sensor <u>Remarks</u>	<u>FY 2019</u> -	<u>FY 2020</u> -	FY 2021 Base 0.000	<u>FY 2021</u> <u>OCO</u> -	<u>FY 2021</u> <u>Total</u> 0.000	<u>FY 2022</u> 35.960	<u>FY 2023</u> 147.055	<u>FY 202</u> 306.66	24 FY 202 69 348.62	<u>Cost To</u> 5 <u>Complete</u> 4 Continuing	Total Cost Continuing	
D. Acquisition Strategy To enhance the Warfighter's lethalit (OTA) agreements for rapid prototy approach (Section 804, FY 2016 N	ty, survivability ping, qualifica DAA) authoriti	/, and comb tion, and ini es were leve	at effectiven tial fielding e eraged in co	ess, the Arm fforts to mee njunction wit	ny used full a et the intent o h the OTA to	and open con of FY 2018 N o facilitate an	npetitive pro DAA Congr d accelerate	cesses w essional l e the LTA	ithin Other T anguage. Mi MDS prograi	ransactions A ddle Tier Acq n. OTA promo	uthority uisition otes non-	
PE 0604114A: Lower Tier Air Missile Army	e Defense (LT/	AMD) S		UNCLAS Page 3	SIFIED 3 of 8		R-1 Line	#101			477	

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020		
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0604114A I Lower Tier Air Missile	EX2 / Lowe	er Tier Air Missile Defense
	Defense (LTAMD) Sensor	(LTAMD) C	Capability

traditional defense contractor involvement, cost sharing arrangements, and accelerates schedules. A FEDBIZOPS announcement and subsequent LTAMDS Industry Day generated government-contractor dialogue, provided contractor cost and schedule estimates, verified industry technology and manufacturing readiness, and informed stakeholders on design approaches and potential materiel solutions. This approach also provides senior leader decision points along the way to make informed decisions based on industry ability to meet threshold requirements. The Sense-Off conducted in 3rd Quarter (Q) FY 2019 along with industry proposals enabled the selection of an LTAMDS single vendor with the subsequent award of the OTA Agreement in 1Q FY 2020. Planned demonstration of military utility of the LTAMDS PRUs occurs in 3Q FY 2022 during the Early User Test (EUT). A planned Urgent Materiel Release decision point occurs in 1Q FY 2023 subsequent to a declaration of success for the Rapid Prototyping program evidenced by the EUT results. The UMR decision point enables the decision for Rapid Fielding and the procurement of the follow on sixteen sensors planned in 1Q FY 2023.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	y								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4							ogram Ele 4114A / L e (LTAMD	ement (N .ower Tie)) Sensor	umber/N r Air Miss	ame) ile	Project (Number/Name) EX2 I Lower Tier Air Missile Defense (LTAMD) Capability				
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
Government Program Management	MIPR	Various : Redstone Arsenal, AL	9.800	4.515	Oct 2018	2.350	Oct 2019	4.100	Oct 2020	-		4.100	Continuing	Continuing	-
Systems Engineering and Technical Assistance (SETA)	Various	Systems Engineering and Technical Assistance : Huntsville, AL	8.000	5.000	Oct 2018	3.509	Oct 2019	6.000	Oct 2020	-		6.000	Continuing	Continuing	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		17.246		-		-		-	0.000	17.246	-
		Subtotal	17.800	9.515		23.105		10.100		-		10.100	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
Concept Definition	C/CPFF	Raytheon, Lockheed Martin, Technovative Applications, Northrop Grumman : Andover MA; Liverpool NY; Brea CA; Linthicum MD	64.817	10.000	Jan 2019	-		-		-		-	0.000	74.817	-
Product Development Support	C/Various	University Affiliated Research Center (UARC); MIT; The Federally Funded Research and Development Center (FFRDC) : Various	-	3.000	Oct 2018	6.349	Dec 2019	5.250	Oct 2020	-		5.250	Continuing	Continuing	-
Prototype Manufacturing and Integration (Rapid Prototyping)	C/FFP	Raytheon : Various	-	51.366	Oct 2019	293.703	Jan 2020	228.774	Feb 2021	-		228.774	Continuing	Continuing	-
Development Engineering/ Contractor SEPM & Test	Various	CCDC WDI; Picatinny Arsenal : Various	-	-		-		103.999	Feb 2021	-		103.999	Continuing	Continuing	-

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4							ogram Ele 4114A / L e (LTAMD	e ment (N .ower Tie)) Sensor	lumber/Na er Air Missi	ame) ile	Project (Number/Name) EX2 I Lower Tier Air Missile Defense (LTAMD) Capability				
Product Development (\$ in Millions)					FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO				
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	64.817	64.366		300.052		338.023		-		338.023	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
Product Development	C/Various	Army Laboratories, S3I System Integration Laboratory, CCDC : Various	-	-		2.454	Dec 2019	2.250	Dec 2020	-		2.250	Continuing	Continuing	-
		Subtotal	-	-		2.454		2.250		-		2.250	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 Planning/Targets/ Interceptors/U.S. Other Government Agencies (OGAs)	MIPR	RDEC, SED, WSMR- T&E Support : Huntsville, AL; White Sands, NM	8.595	11.100	Jan 2019	54.161	Jan 2020	26.000	Feb 2021	-		26.000	Continuing	Continuing	-
		Subtotal	8.595	11.100		54.161		26.000		-		26.000	Continuing	Continuing	N/A
Prior Years		FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
		Project Cost Totals	91.212	84.981		379.772		376.373		-		376.373	Continuing	Continuing	N/A
Remarks															

480
Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army																	D)ate:	Fel	oruary	/ 20	20				
Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name)ProjectPE 0604114A / Lower Tier Air MissileEX2Defense (LTAMD) Sensor(LTA										o ject (I 2 / Lov AMD)	Nur ver Caj	nber Tier pabili	' /Na Air ity	i me) Missil	le D	Defer	ise		
Event Neme		FY	2019		F۲	r 202	20		FY	2021		F	Y	2022		FY 2	023		F	Y 20	024		F	Y 20	025	
Event Name	1	2	3 4	1	2	3	4	1	2	3 4	4	1	2	3 4	1	2	3 4	1	1 2		3 4	1	1 2	2	3	4
Concept Definition	CD																									
Select Single Vendor			Sel	ect Sing	gle Ve	endor																				
Production Representative Unit Manufacturing				Produ	uction	Repres	sentativ	e Unit I	Manufa	cturing																
Qualification Testing											9	ualificat	tion T	esting	•											
Developmental Test & Evaluation												Develo	pmer	ital Test (& Evaluat	ion										
Limited User Test/Early User Test (LUT/EUT)														Limite	d User Te	st/Early	User Test		T/EUT)							
Initial Operational Capability (Urgent Material Release)															2 IOC (U	MR)										
Production Long Lead Decision															Product	Long Le	ad Decisi	on								
Production															Producti	on Cont	ract Awar	d								
															Pr	oduction	r									

hibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febr	uary 2020
propriation/Budget Activity 40 / 4	R-1 Program PE 0604114A <i>Defense (LTAI</i>	Element (Numbe I Lower Tier Air M MD) Sensor	Project (Number/Nan EX2 / Lower Tier Air N (LTAMD) Capability	ne) Iissile Defense	
	Schedule Detail	5			
		St	art	E	nd
Events		Quarter	Year	Quarter	Year
Concept Definition		4	2017	4	2019
Select Single Vendor		1	2020	1	2020
Production Representative Unit Manufacturing		1	2020	4	2022
Qualification Testing		1	2022	1	2023
Developmental Test & Evaluation		1	2022	4	2022
Limited User Test/Early User Test (LUT/EUT)		3	2022	1	2023
Initial Operational Capability (Urgent Material Release)		1	2023	1	2023
Production Long Lead Decision		1	2023	1	2023
Production Contract Award		1	2023	1	2023
Production		1	2023	3	2027

Exhibit R-2, RDT&E Budget Item	Date: February 2020											
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	anced	R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives										
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	-	91.749	179.676	156.834	-	156.834	268.981	314.698	253.827	254.563	0.000	1,520.328
AX3: Technology Maturation Initiatives	-	0.000	0.000	13.986	-	13.986	138.114	296.715	253.827	254.563	0.000	957.205
AX4: Computational Prototyping Environment (CPE)	-	0.000	3.966	5.421	-	5.421	6.912	0.000	0.000	0.000	0.000	16.299
AX5: Next Generation Close Combat Missile	-	0.000	9.000	4.995	-	4.995	0.000	0.000	0.000	0.000	0.000	13.995
AX6: Active Protection Systems Integration	-	0.000	7.400	10.490	-	10.490	0.000	0.000	0.000	0.000	0.000	17.890
AX7: Multi-Mission High Energy Laser (MMHEL) Sys Demo	-	0.000	18.650	8.142	-	8.142	0.000	0.000	0.000	0.000	0.000	26.792
AX8: Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)	-	0.000	27.200	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	27.200
AX9: Adv Mobility Experimental Prototype Adv Tech	-	0.000	10.500	15.785	-	15.785	10.490	7.193	0.000	0.000	0.000	43.968
AY1: MUM-T Platform Enabler	-	0.000	7.200	4.496	-	4.496	4.196	0.000	0.000	0.000	0.000	15.892
AY2: Army Operational Fires	-	0.000	18.900	28.372	-	28.372	38.336	10.790	0.000	0.000	0.000	96.398
AY3: Strategic Long Range Cannon	-	0.000	76.860	65.147	-	65.147	70.933	0.000	0.000	0.000	0.000	212.940
DS3: Technology Maturation Initiatives	-	91.749	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	91.749

A. Mission Description and Budget Item Justification

This Program Element (PE) funds experimental prototyping and demonstration of selected technology enabled capabilities to support advanced ground systems, aviation systems, command, control, communications & reconnaissance systems and equipment, precision weapons, High Energy Laser (HEL) systems, and Soldier equipment. Funding facilitates maturation and demonstration of advanced technologies and systems in relevant environments and tactical/operational scenarios as well as the maturation and demonstration of a robust Virtual Proving Ground (VPG) for rapid, accurate, and computational prototyping of major Army platforms. Benefits include maturing technologies to a goal of Technology Readiness Level (TRL) 7, informing emerging requirements for future programs of record, and reducing technology risk in order to transition of leap-ahead capabilities into acquisition programs. Technology Maturation Initiative efforts mature and integrate advanced component technologies into system and sub-system technology demonstrators and experimental prototypes, which are then validated and transitioned to priority

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Arr	ny			Date:	February 2020
Appropriation/Budget Activity		R-1 Program El	ement (Number/Name))	
2040: Research, Development, Test & Evaluation, Army I BA	: Advanced	PE 0604115A / 7	Technology Maturation I	nitiatives	
Component Development & Prototypes (ACD&P)		<u> </u>			<u> </u>
Army experimentation efforts and programs of record. This PE	provides the Ar	my with an improv	ved mechanism for enal	oling greater competition	n in the latter stages of
technology maturation and establishes a closer alignment bet	ween Science ar	ia rechnology (Se	(x) enorts and acquisition	on programs.	
The cited work is consistent with the Under Secretary of Defe	nse Research a	nd Engineering pri	iority focus areas and th	e Army Modernization	Strategy
					Strategy.
Work in this PE is performed by the United States (U.S.) Army	/ Futures Comma	and (AFC), the En	gineer Research Develo	opment Center (ERDC)	, and U.S. Army Space
and Missile Defense Command/Army Forces Strategic Comm	and (SMDC/ARS	STRAT).	-		
B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	95.229	196.676	156.986	-	156.986
Current President's Budget	91.749	179.676	156.834	-	156.834
Total Adjustments	-3.480	-17.000	-0.152	-	-0.152
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-17.000			
 Congressional Rescissions 	-	-			
Congressional Adds	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-3.480	-			
SBIR/STTR Transfer	-	-	0.455		0.450
 Adjustments to Budget Years 	-	-	-0.152	-	-0.152

Exhibit R-2A, RDT&E Project Ju		Date: February 2020										
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060411 <i>Initiatives</i>	am Elemen 5A / Techno	umber/Nan nology Mat	ne) uration Initia	atives						
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
AX3: Technology Maturation Initiatives	-	0.000	0.000	13.986	-	13.986	138.114	296.715	253.827	254.563	0.000	957.205
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

This is a new start in FY2021.

This Project is a New Start in Fiscal Year 2021 (FY21).

A. Mission Description and Budget Item Justification

This Project funds the Technology Maturation Initiative, which matures and integrates component technologies into early system and sub-system experimental prototypes for demonstration in relevant environments and tactical/operational scenarios. The Technology Maturation Initiative takes emerging Science and Technology (S&T) products to a goal of Technology Readiness Level (TRL) 7, integrating them into technology demonstrators and experimental prototypes that inform requirements and reduce the risk of technology insertion for future acquisition programs. This Initiative streamlines the development and insertion of mature technologies that support advanced ground systems; aviation systems; command, control, communication & reconnaissance systems and equipment; precision weapons; High Energy Laser (HEL) systems; and Soldier equipment. It provides the Army an improved mechanism for incorporating innovative technologies and advanced capabilities in the early stages of acquisition program planning, and more closely aligns high-priority S&T products and future Programs of Record.

Army senior leadership approves Technology Maturation Initiative projects prior to budget year programming based on priority and opportunity, ensuring that demonstrations have a high potential for filling capability gaps and transitioning. Approved Technology Maturation Initiative projects are typically 2-4 years in duration and are budgeted under Projects AX4, AX5, AX6, AX7, AX8, AX9, AY1, AY2, and AY3.

The cited work is consistent with the Under Secretary of Defense, Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
<i>Title:</i> Future Vertical Lift (FVL) Helmet Mounted Display	-	-	3.900
Description: This effort will integrate and demonstrate a TRL 7 rotorcraft Helmet Mounted Display (HMD) compatible with current 56P helmets and FVL distributed aperture systems (DASs). This will enable heads up, eyes out pilotage and improve situational awareness (SA) and maneuver for FVL pilots in all conditions. The HMD will have a head tracker system that is self-contained and self-calibrating.			
FY 2021 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020)
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives	Project (I AX3 / Tec	Number/l hnology	Name) Maturation Ini	itiatives
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2019	FY 2020	FY 2021
Will mature and integrate novel HMDs with high bright full color high resolution free-form prism optics, and low cost micro complementary metal?oxide?semice by Army aviators in all pilotage conditions; and mature inertial measurement ur tracking hardware/software.	organic light-emitting diodes (OLEDs), low cos onductor (CMOS) cameras optimized for utiliza hit (IMU) technologies for integration with head	st ition			
FY 2020 to FY 2021 Increase/Decrease Statement: This FY21 effort was approved by the Army Prototyping Board to support the A	rmy's Modernization Priority for Future Vertica	l Lift.			
Title: Large Caliber Armament System Prototype			-	-	10.086
Description: This effort will integrate and demonstrate a TRL 7 lightweight arm platforms.	nament system for current and future combat				
FY 2021 Plans: Will mature and integrate 120mm reduced-recoil armament system in a test be Vehicle requirements; will fabricate turret and ammunition and handling system	d configuration to inform Next Generation Con is for integration.	nbat			
FY 2020 to FY 2021 Increase/Decrease Statement: This FY21 effort was approved by the Army Prototyping Board to support the A Combat Vehicles.	rmy's Modernization Priority for Next Generati	on			
	Accomplishments/Planned Programs Sub	totals	-	-	13.986
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A					

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army														Date: February 2020				
Appropriation/Budge 2040 / 4	et Activity			R-1 Pro PE 0604 Initiative	o gram Ele 4115A / 7 es	ement (N Technolog	umber/N y Matura	ame) tion	Project AX3 / To	(Number echnology	/ Name) ⁄ Maturatio	on Initiati	ves					
Support (\$ in Millions) FY 20					FY 2019 FY 2020			FY 2 Ba	021 se	FY 2 OC	2021 CO	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			
Future Vertical Lift Helmet Mounted Display (FVL HMD)	C/Various	AFC : Fort Belvoir, VA	-	-		-		3.900		-		3.900	13.000	16.900	-			
Large Caliber Armament System Prototype	C/Various	AFC : Picatinny, NJ	-	-		-		10.086		-		10.086	18.400	28.486	-			
		Subtotal	-	-		-		13.986		-		13.986	31.400	45.386	N/A			
		Project Cost Totals	Prior Years	FY 2	2019	FY 2	2020	FY 2 Ba	021 se	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract			
Project Cost Totals -				-		0.000		13.986		-		13.986	31.400	45.386	N/A			

Remarks

Appropriation/Budget Activity R1 Program Element (Number/Name) Project (Number/Name) 2040 1 4 N3 1 Technology Maturation N3 1 Technology Maturation Initiatives Note: Technology Maturation Note: Technology Maturation Note: Technology Maturation Initiatives Second 11 2 3 4 1 2 1 3 4 1 2 1 3 4 1 2 1 4 1 4 1 4 1 4 1 4 1 4 1	Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army											Date: February 2020																			
Event Name FY 2019 FY 2020 FY 2021 FY 2023 FY 2024 FY 2025 Large Caliber Armament System Prototype 1 2 3 4 1	Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name)ProjPE 0604115A / Technology MaturationAX3InitiativesAX3									oje 3 /	ct (N Tec	lun hno	n be logj	r/Na y Ma	i me) aturati	ion	n Init	iativ	/es					
Image: Contracting of the second of the s	Event Name		F١	2019			FY	2020	0		FY	202	1		F١	Y 20	22			FY 2	202	3		F	Y 20	024	Τ		FY	202	5
Large Caliber Armament System Prototype Fabricate Turret Fabricate Turret Fabricate Ammunition Handling System Characterize munitions Integration of Weapon System Components FVL Heimet Mounted Dislay Display System Design Head Tracker Design Tracker/Display Integration & Test Design FVL Display Integration Tracker/Display Integration Fight Testing and Demonstrations		1	2	3	1	1	2	3	4	1	2	3	4	1	2	3	4	, ·	1	2	3	4	1	1	2 :	3 4	1	1	2	3	4
Fabricate Turret Fabricate Ammunition Handling System Characterize munitions Integration of Weapon System Components FVL Heimet Mounted Dislay Display System Design Head Tracker Design Tracker/Display Integration & Test Design FVL Display Integration & Test Fight Testing and Demonstrations	Large Caliber Armament System Prototype																														
Fabricate Ammunition Handling System Characterize munitions Integration of Weapon System Components FVL Heimet Mounted Dislay Display System Design Head Tracker/Display Integration & Test Design FVL Display Integration & Test Fight Testing and Demonstrations	Fabricate Turret																														
Characterize munitions Integration of Weapon System Components FVL Heimet Mounted Dislay Display System Design Head Tracker Design Tracker/Display Integration & Test Design FVL Display Interface Flight Testing and Demonstrations	Fabricate Ammunition Handling System																														
Integration of Weapon System Components FVL Helmet Mounted Dislay Display System Design Head Tracker Design Tracker/Display Integration & Test Design FVL Display Interface Flight Testing and Demonstrations	Characterize munitions																														
FVL Helmet Mounted Dislay Display System Design Head Tracker Design Tracker/Display Integration & Test Design FVL Display Interface Flight Testing and Demonstrations	Integration of Weapon System Components																														
Display System Design Head Tracker Design Tracker/Display Integration & Test Design FVL Display Interface Flight Testing and Demonstrations	FVL Helmet Mounted Dislay																														
Head Tracker Design Tracker/Display Integration & Test Design FVL Display Interface Flight Testing and Demonstrations	Display System Design																														
Tracker/Display Integration & Test Design FVL Display Interface Flight Testing and Demonstrations	Head Tracker Design																														
Design FVL Display Interface Flight Testing and Demonstrations	Tracker/Display Integration & Test																														
Flight Testing and Demonstrations	Design FVL Display Interface																														
	Flight Testing and Demonstrations																														

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febr	uary 2020
ppropriation/Budget Activity 040 / 4	R-1 Program PE 0604115A <i>Initiatives</i>	Element (Numbe I Technology Mate	r /Name) uration	Project (Number/Nan AX3 / Technology Mat	ne) uration Initiatives
	Schedule Detail	S			
		St	art	E	nd
Events		Quarter	Year	Quarter	Year
Large Caliber Armament System Prototype		1	2021	4	2023
Fabricate Turret		1	2021	1	2022
Fabricate Ammunition Handling System		1	2021	1	2022
Characterize munitions		4	2021	4	2022
Integration of Weapon System Components		4	2021	1	2023
FVL Helmet Mounted Dislay		1	2021	4	2023
Display System Design		1	2021	3	2021
Head Tracker Design		2	2021	4	2021
Tracker/Display Integration & Test		1	2022	4	2022
Design FVL Display Interface		1	2022	2	2023
Flight Testing and Demonstrations		2	2023	4	2023

Exhibit R-2A, RDT&E Project Ju	hibit R-2A, RDT&E Project Justification: PB 2021 Army												
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060411 <i>Initiatives</i>	am Elemen 5A / Techno	t (Number/l blogy Matur	Name) ation	Project (N AX4 / Com Environme	umber/Nan putational F nt (CPE)	n e) 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	
AX4: Computational Prototyping Environment (CPE)	-	0.000	3.966	5.421	-	5.421	6.912	0.000	0.000	0.000	0.000	16.299	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

Note

In Fiscal Year 2020 (FY20) this Project was realigned from:

Program Element (PE) 0604115A Technology Maturation Initiatives

* Project DS3 Technology Maturation Initiatives

A. Mission Description and Budget Item Justification

This Project funds the development and demonstration of a robust Virtual Proving Ground (VPG) for rapid, accurate, and computational prototyping of major Army platforms. Computation Prototyping Environment (CPE) provides the ability to validate platform design variations in a VPG, in a way that identifies potential performance and design failures, and assesses mitigating solutions and trades prior to cost-bearing production and manufacturing. Activities under this Project include the maturation and integration of physics-based, computational modeling with new advances in deep learning in order to provide the ability to virtually explore design tradespaces and understand possible defeat strategies. This Project leverages recent Department of Defense (DOD) advancements in large data tradespace analytics, highfidelity physics-based modeling, deep learning techniques, high-performance computing capabilities, and inverse modeling approaches to enable rapid computational prototyping to inform emerging acquisition programs.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Funding has been realigned to reflect the FY20 financial restructure and Army Modernization Priorities.

Work in this Project is performed by the Engineer Research and Development Center (ERDC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Computational Prototyping Environment (CPE)	-	3.923	5.421
Description: This effort matures and integrates physics-based, computational modeling with new advances in deep learning in order to demonstrate a robust VPG that provides the ability to virtually explore design tradespaces and understand possible defeat strategies for prototype Army platforms. Demonstrates rapid computational prototyping to inform emerging acquisition programs through large data tradespace analytics, high-fidelity physics-based modeling, deep learning techniques, high-performance computing capabilities, and inverse modeling approaches. CAT capabilities will be piloted to support and inform Army Future Vertical Lift (FVL) platform designs.			
FY 2020 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020)		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives	Project AX4 / Co Environr	ject (Number/Name) I Computational Prototyping vironment (CPE)				
B. Accomplishments/Planned Programs (\$ in Millions)		I	Y 2019	FY 2020	FY 2021		
Will integrate physical test data from Future Vertical Lift platforms into prototyp leverage DOD high-performance computing to begin integration of artificial inte Develop framework for incorporating environmental and mission relevant data for physical test data, computational models, and operation environments.	be VPG to validate computational models. Will elligence and machine learning algorithms into to virtual proving ground. Develop data reposi	VPG. tory					
FY 2021 Plans: Will continue to develop data repository for physical test data, computational m Performance Computing environment; improve the FVL VPG to model candida designs during maneuver and improve the VPG to include different operational machine learning techniques to drive engineering analysis of FVL systems.	nodels, and operational environments linked to ate Future Attack Reconnaissance Aircraft (FA Ily relevant environmental conditions; improve) High RA)					
FY 2020 to FY 2021 Increase/Decrease Statement: Planned program progression.							
Title: FY 2020 SBIR/STTR Transfer			-	0.043	-		
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 Sub	ototals	-	3.966	5.421		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A							

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity					R-1 Program Element (Number/Name)Project (Number/Name)PE 0604115A / Technology MaturationAX4 / ComputerInitiativesEnvironment (Initiatives)					(Number computation ment (CP	r/Name) onal Proto E)	typing		
Management Service	es (\$ in M	illions)		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	-	-		0.043		-		-		-	0.000	0.043	-
		Subtotal	-	-		0.043		-		-		-	0.000	0.043	N/A
Support (\$ in Millions	5)			FY	2019	FY 2	020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
Computational Prototyping Environment	C/Various	ERDC : Vicksburg, MS	-	-		3.923		5.421		-		5.421	6.918	16.262	-
		Subtotal	-	-		3.923		5.421		-		5.421	6.918	16.262	N/A
			Prior Years	FY	2019	FY 2	020	FY 2 Ba	2021 Ise	FY 2 Of	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-		3.966		5.421		-		5.421	6.918	16.305	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021.	Army				Date: February 2020			
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 <i>Initiati</i>	rogram Elemen 04115A / Techn ves	Number/Name) mputational Prototyping ent (CPE)			
Event Name	FY 2019	FY 202	20	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Computational Prototyping Environment								

propriation/Budget Activity				Date: Febru	ary 2020		
0/4	R-1 Progra PE 0604115 <i>Initiatives</i>	n Element (Number A I Technology Matu	/Name) ration	Project (Number/Name) AX4 I Computational Prototyping Environment (CPE)			
	Schedule Deta	ils					
		Sta	rt	En	d		
Events		Quarter	Year	Quarter	Year		
Computational Prototyping Environment		3	2018	4	2022		

Exhibit R-2A, RDT&E Project Ju	xhibit R-2A, RDT&E Project Justification: PB 2021 Army											
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation InitiativesProject (N AX5 / Next 					umber/Name) t Generation Close Combat		
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
AX5: Next Generation Close Combat Missile	-	0.000	9.000	4.995	-	4.995	0.000	0.000	0.000	0.000	0.000	13.995
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
<u>Note</u> In Fiscal Year 2020 (FY20) this P	roject was ı	realigned fro	om:									

Program Element (PE) 0604115A Technology Maturation Initiatives

* Project DS3 Technology Maturation Initiatives

A. Mission Description and Budget Item Justification

This Project demonstrates a prototype close combat missile with a multi-pulse, boost-sustain flight propulsion system providing extended range and decreased time of flight. Activities mature proof-of-principle hardware into an integrated tactical-representative design, and demonstrate a prototype missile with lethality overmatch of emerging threats. Early prototyping work concludes in Fiscal Year 2021 (FY21) to mature technology and demonstrate needed Warfighter capability in advance of acquisition program of record.

Work in this PE complements PE 0603462A (Next Generation Combat Vehicle Advanced Technology.

Funding has been realigned to reflect the FY20 financial restructure and Army Modernization Priorities.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Next Generation Close Combat Missile	-	9.000	4.995
Description: This effort demonstrates a prototype close combat missile with a multi-pulse, boost-sustain flight propulsion system providing extended range and decreased time of flight.			
FY 2020 Plans: Will optimize, integrate, and conduct experimental testing of the prototype propulsion subsystem component hardware (Electro-Mechanical Control Actuation System, Airframe, Launch Motor, and a Boost-Sustain Propulsion Section). Will conduct wind tunnel			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020			
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A <i>I Technology Maturation</i> <i>Initiatives</i>	Project (Number/Name)nAX5 / Next Generation Close Combat Missile					
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2019	FY 2020	FY 2021		
testing to verify predicted aerodynamic and control surface performance. Will e integrated flight simulation and mature flight software.	exercise subsystem performance models in ar	۱					
FY 2021 Plans: Will evaluate performance of propulsion system components, integrated in a tademonstration; transition designs, documentation and data to Program Execut	actically-representative missile, through flight tive Office Missiles and Space.						
FY 2020 to FY 2021 Increase/Decrease Statement: Planned program progression.							
	Accomplishments/Planned Programs Sul	ototals	-	9.000	4.995		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A							

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0604115A / Technology MaturationProject (N AX5 / Next Missile					(Number ext Gener	Number/Name) xt Generation Close Combat			
Support (\$ in Millions)				FY	2019	FY 2	020	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
Next Generation Close Combat Missile	Various	AvMC : Huntsville, AL	-	-		9.000		4.995		-		4.995	0.000	13.995	-
		Subtotal	-	-		9.000		4.995		-		4.995	0.000	13.995	N/A
Pr Ye		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			-		9.000		4.995		-		4.995	0.000	13.995	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 /	Army				Date: February 2020			
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 <i>Initiati</i>	rogram Elemen 604115A / Techn ives	Number/Name) xt Generation Close Combat			
	EV 2010	EX 202	0000 EX 2004 EX 2000			EX 2023	EV 2024	EV 2025
Event Name	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Next Generation Close Combat Missile								

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army Date: February 2020								
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0604115A <i>Initiatives</i>	Element (Number I Technology Matu	Project (Number/Name) AX5 / Next Generation Close Combat Missile					
	Schedule Detail	S						
		Sta	rt	End				
Events		Quarter	Year	Quarter	Year			
Next Generation Close Combat Missile		1	2019	4	2021			

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity R-1 Program Element (Number/Name) 2040 / 4 PE 0604115A / Technology Maturation Initiatives Initiatives						Project (Number/Name) AX6 / Active Protection Systems Integration						
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
AX6: Active Protection Systems Integration	-	0.000	7.400	10.490	-	10.490	0.000	0.000	0.000	0.000	0.000	17.890
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year (FY) 2020 this Project was realigned from:

Program Element (PE) 0604115A Technology Maturation Initiatives

* Project DS3 Technology Maturation Initiatives

A. Mission Description and Budget Item Justification

This Project matures, integrates, and demonstrates protection and survivability technologies as part of active protection systems (APS) prototyping for the Army's combat vehicles. Activities integrate complimentary survivability technologies to enable layers of enhanced protection capability, providing greater survivability against current and emerging advanced threats. This Project demonstrates a suite of technologies on a fielded combat vehicle platform using an APS common architecture, and defines component interface standards and specifications that enable adaptive APS solutions. Activities support the Army's APS strategy to maintain or reduce vehicle weight by reducing reliance on armor with other means such as sensing, warning, hostile fire detection, and active countermeasures.

Work in this Project is coordinated with PE 0603462A (Next Generation Combat Vehicle Advanced Technology) and transitions to PE 0604852A (Suite of Vehicle Protection Systems - EMD).

Funding has been realigned to reflect the FY20 financial restructure and Army Modernization Priorities.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work is performed by the United States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Agile Layered Protection: APS Integration Advanced Technology Demonstrator	-	7.400	10.490
Description: Activities integrate and demonstrate mature APS technologies layered through a common architecture on an Army ground combat vehicle platform, addressing technical and integration challenges for a system designed to address both current and emerging advanced threats. Selects and integrates mature component technologies that are best suited to optimize added capability for the ATD platform. Demonstrates a suite of APS technologies and effects that optimize performance levels			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020)
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives	Project (Number/ AX6 / Active Prote	Name) ction Systems	s Integration
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
for survivability and protection through advanced threat detection, mu awareness.	Iltiple threat defeat systems, and improved situational			
FY 2020 Plans: Will continue to integrate selected APS technologies onto the combat APS system function on the demonstrator, and test and evaluate the does not introduce unintended degraded performance to the vehicle? vehicle Product Manager?s acquisition planning for the APS protection approach and select additional (mature) APS component technologie for protection and survivability for the vehicle platform.	t vehicle platform demonstrator. Will validate the integra platform vehicle to ensure the added suite of technolog 's mission. Upon completion of testing, results will inform on suite. Will continue the vehicle protection layering es for integration, offering incremental improvement opti	ated jies m ons		
FY 2021 Plans: Will continue maturing the combat vehicle protection layering approace capabilities based on selection of mature technologies in FY20; optimprotection technologies on the combat vehicle platform demonstrator demonstrator to ensure the added technologies do not degrade the vertex.	ch, integrating additional protection and survivability nize, design, and demonstrate integration of selected to validate integration; test the combat vehicle platform ehicle?s or previously tested technologies? performance	ı ce.		
FY 2020 to FY 2021 Increase/Decrease Statement: Planned program progression.				
	Accomplishments/Planned Programs Sub	ototals -	7.400	10.490
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A				

Exhibit R-3, RDT&E F	Project Co	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	,				R-1 Pro PE 060 <i>Initiative</i>	o gram Ele 4115A / 7 es	ement (N Fechnolog	umber/N y Matura	ame) tion	Project AX6 / A	(Number ctive Prot	r/Name) ection Sys	stems Int	egration
Support (\$ in Million		FY 2	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2 O	2021 CO	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
Engineer Integration of APS Layered Protection	C/Various	Various : Various	-	-		4.400		-		-		-	0.000	4.400	-
Validation of APS Layered Protection	Various	Various : Various	-	-		2.000		-		-		-	0.000	2.000	-
Integration of added APS Layered Protection	C/Various	Various : Various	-	-		1.000		4.990		-		4.990	0.000	5.990	-
Validation of added APS Layered Protection	C/Various	AFC : Warren, MI	-	-		-		5.500		-		5.500	0.000	5.500	-
		Subtotal	-	-		7.400		10.490		-		10.490	0.000	17.890	N/A
			Prior Years	FY 2	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2 O(2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		7.400		10.490		-		10.490	0.000	17.890	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy						Date: February	2020
Appropriation/Budget Activity 2040 / 4			R-1 F PE 0 <i>Initia</i>	Program Elemer 604115A / Techn tives	nt (Number/Name pology Maturation	e) Project (N AX6 / Acti	Iumber/Name) ve Protection Sys	stems Integration
Event Name	FY 2019	FY 20	20	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Active Protection Systems Integration	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Integration of APS Layered Protection Technologies (060411								
Validation of Integrated Layered Protection Technologies								
Integration of Added APS Layered Protection Technologies								
Validation of Added APS Layered Protection Technologies								

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name PE 0604115A / Technology Maturation Initiatives	Project (Number/Name) AX6 / Active Protection Systems Integration
	Schedule Details	

	St	art	E	nd
Events	Quarter	Year	Quarter	Year
Active Protection Systems Integration	1	2019	4	2021
Integration of APS Layered Protection Technologies (0604115A, DS3 in FY 2019)	1	2019	3	2020
Validation of Integrated Layered Protection Technologies	3	2020	4	2020
Integration of Added APS Layered Protection Technologies	1	2021	3	2021
Validation of Added APS Layered Protection Technologies	3	2021	4	2021

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4			R-1 Progra PE 060411 <i>Initiatives</i>	am Elemen 5A / Techno	t (Number/ blogy Matur	Number/Name) Ilti-Mission High Energy Laser) Sys Demo						
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
AX7: Multi-Mission High Energy Laser (MMHEL) Sys Demo	-	0.000	18.650	8.142	-	8.142	0.000	0.000	0.000	0.000	0.000	26.792
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY2021.

In Fiscal Year 2020 (FY20) this Project was realigned from:

Program Element (PE) 0604115A Technology Maturation Initiatives

* Project DS3 Technology Maturation Initiatives

A. Mission Description and Budget Item Justification

This Project matures and demonstrates an integrated a 50 kilowatt (kW)-class laser weapon system into a Stryker platform, providing a system-level, High Energy Laser (HEL) experimental prototype for demonstration in realistic operating environments. These demonstrations will inform requirements, decrease risk for future Army HEL acquisition programs, and support the future development of warfighter Tactics/Techniques/Procedures and Concept of Operations. HEL weapon systems are expected to complement conventional offensive and defensive weapons at a lower cost-per-shot than current systems and without the need to stockpile ordnance. A 50 kW-class laser weapon system has the potential to engage and defeat rockets, artillery, mortars (RAM); unmanned aerial vehicles (UAVs); sensors; and optics for maneuvering Brigade Combat Teams (BCTs). Demonstrations will also inform potential future capability to defeat both fixed- and rotary-wing manned aircraft. Leveraging Government investments and Industry technology advancements, will review and select existing HEL subsystem designs for integration into a Stryker combat vehicle; will conduct integration and demonstration of a system-level HEL experimental prototype; and will provide assessment of technical performance in an operational environment. This effort informs application of laser weapons to other combat platforms and rapid prototyping to units-of-action to meet emerging threats expressed in the National Defense Strategy.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Rapid Capabilities and Critical Technologies Office (RCCTO).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Multi-Mission High Energy Laser (MMHEL) Integration and Demonstration	-	17.804	8.142
Description: This effort matures, integrates, and demonstrates HEL technologies on Army Stryker vehicles to inform Maneuver-Short Range Air Defense (M-SHORAD) requirements and reduce risk for M-SHORAD. The goal is to protect maneuvering forces from RAM and Unmanned Aerial System (UAS) threats.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date	: February 2020)
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A <i>I Technology Maturation</i> <i>Initiatives</i>	Project (Numb AX7 / Multi-Miss (MMHEL) Sys L	e r/Name) sion High Energy Demo	/Laser
B. Accomplishments/Planned Programs (\$ in Millions)		FY 201	FY 2020	FY 2021
<i>FY 2020 Plans:</i> Will complete procurement and integration of system hardware; will complete parameters; will continue integrating initial firing doctrine as well as Battle Ma Computer, and Intelligence software; will begin planning technology readines demonstration; and begin the system level test/fix/test process of MMHEL.	evaluation of subsystems against performance nagement, Communications, Command, Contr s level 7 demonstration, procure targets for the	e ol,		
FY 2021 Plans: Will complete integration of system hardware, weapon fire control software, F (FAADC2), and Intelligence software; conduct full system level test/fix/test proprepare for and execute a technology readiness level 7 demonstration; and p to inform Capability Developer?s requirement, Concept of Operations (CONC	Forward Area Air Defense Command and Contr pcess; system verification and acceptance test repare for and execute system performance te OPS) and training development.	ol ng; sting		
FY 2020 to FY 2021 Increase/Decrease Statement: Planned program progression.				
Title: FY 2020 SBIR/STTR Transfer			- 0.846	-
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			40.050	0.440
	Accomplishments/Planned Programs Sul	ototals	- 18.650	8.142
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A				

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	,				R-1 Pro PE 060 Initiative	9 gram El 4115A / 7 es	ement (N Fechnolog	umber/N y Matura	ame) tion	Project AX7 / N (MMHE	(Number Iulti-Missia L) Sys De	r /Name) on High Ei emo	nergy La	ser
Management Service	es (\$ in M	illions)		FY	2019	FY 2	020	FY 2 Ba	:021 se	FY 2	2021 CO	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	-	-		0.846		-		-		-	0.000	0.846	-
		Subtotal	-	-		0.846		-		-		-	0.000	0.846	N/A
Product Developmen	nt (\$ in Mi	illions)		FY	2019	FY 2	020	FY 2 Ba	:021 se	FY 2	2021 CO	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
Multi-Mission High Energy Laser (MMHEL) Integration and Demonstration	C/Various	SMDTC : Huntsville, AL	-	-		17.804		8.142		-		8.142	0.000	25.946	-
		Subtotal	-	-		17.804		8.142		-		8.142	0.000	25.946	N/A
			Prior Years	FY	2019	FY 2	020	FY 2 Ba	021 se	FY 2 Of	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		18.650		8.142		-		8.142	0.000	26.792	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	٩rm	у																			Da	te: F	ebru	Jary	2020			
Appropriation/Budget Activity 2040 / 4								R-1 PE (<i>Initia</i>	Prog 0604 ative:	g ran 115, s	n Ele A / <i>T</i>	emer ēchn	nt (N nolog	luml gy M	ber/N atura	lame ation	e)	Р А. (Л	roje X7 / /Mŀ	ct (N Mult IEL)	luml ti-Mis Sys	b er / ssioi Der	Nam n Hig no	i e) gh Er	nergy	Las	er	
			× 20	10	Τ	E\	1 202	20		EV	(202	04	1	EV	202	2		EV	202	2		EV	202	4			0.25	
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	2 4	1	2	3	4	1	2	3	4	1	2	3	4
MMHEL – Subsystem Design Refinement, Assembly, and Deliv					ijec										•											I	1	
MMHEL – Firing Doctrine and Experimental Prototype System S																												
MMHEL – Experimental Prototype System Integration and Chec	kout	0																										
MMEHL – Experimental Prototype System Demonstration and A	sse	ss																										
													<u> </u>								I							

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives	Project (N AX7 / Multi (MMHEL) \$	u mber/Name) -Mission High Energy Laser Sys Demo

Schedule Details

	St	art	E	nd
Events	Quarter	Year	Quarter	Year
Multi-Mission High Energy Laser (MMHEL) ? System-Level Design (PE 0604115A, Proj	3	2018	4	2018
MMHEL ? Subsystem Design Refinement, Assembly, and Delivery (PE 0604115A, Projec	4	2018	4	2019
MMHEL ? Firing Doctrine and Experimental Prototype System Software (PE 0604115A	1	2019	3	2021
MMHEL ? Experimental Prototype System Integration and Checkout (PE 0604115A, Pro	2	2019	4	2020
MMEHL ? Experimental Prototype System Demonstration and Assess	4	2020	4	2021

Exhibit R-2A, RDT&E Project Ju	Date: Febr	uary 2020										
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation InitiativesProject (N AX8 / Adv 					umber/Name) Leth and Accuracy Sys for Med .AS-MC)					
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
AX8: Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)	-	0.000	27.200	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	27.200
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In Fiscal Year 2020 (FY20) this Project was realigned from: Program Element (PE) 0604115 Technology Maturation Initiatives * Project DS3 Technology Maturation Initiatives

This Project completes in FY20.

A. Mission Description and Budget Item Justification

This Project matures and integrates next-generation 50mm weapon system technologies transitioned from under the Advanced Lethality and Accuracy System for Medium Caliber (ALAS-MC) advanced technology development effort into a vehicle-agnostic combat turret to inform requirements for the Next Generation Combat Vehicle (NGCV). This Project integrates and assesses critical ALAS-MC 50mm technology components for on-the-move engagement of moving personnel and materiel targets, bringing the subsystem to Technology Readiness Level (TRL) 7. Under Advanced Targeting and Lethality Automated System (ATLAS), this Project matures and integrates advanced Artificial Intelligence/Machine Learning (AI/ML) algorithms to enable aided target detection/recognition capability for NGCV using next generation, multi-spectral electro-optical and infrared (EO/IR) targeting sensors. AI/ML algorithms are integrated with real-time intelligent fire control and mission planning interfaces to demonstrate automated turret capabilities, and provide overmatch via reduced target acquisition and engagement timelines.

Work in this Project is related to and fully integrated with the efforts funded in PE 0603462A (Next Generation Combat Vehicle Advanced Technology) / Project BF5 (Adv Lethality & Accuracy Sys for Med Cal Adv Tech); and Project BG1 (Sensors for Auto Oper and Survivability Adv Tech.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Advanced Lethality and Accuracy System for Med Cal (ALAS-MC)	-	5.000	-
Description: This effort matures and integrates the next generation 50mm weapon system technologies transitioned from the ALAS-MC advanced technology development effort into vehicle- agnostic combat turret to inform requirements for the Next Generation Combat Vehicle.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: I	ebruary 2020)			
Appropriation/Budget ActivityR-1 Program2040 / 4PE 0604115Initiatives	Project (Number / AX8 / Adv Leth an Calber (ALAS-MC	<pre>ject (Number/Name) } / Adv Leth and Accuracy Sys for Med ber (ALAS-MC)</pre>					
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021				
FY 2020 Plans: Will mature next generation 50mm armament and fire control systems to TRL 7 by integrating technologies for on-the-move engagement of moving personnel and materiel targets.	g and assessing 50mm compone	nt					
FY 2020 to FY 2021 Increase/Decrease Statement: ALAS-MC effort completes in FY20.							
Title: Advanced Targeting and Lethality Automated System (ATLAS)		-	20.965	-			
Description: The ATLAS effort matures, integrates, and demonstrates novel algorithms and Generation Combat Vehicle (NGCV) vehicle agnostic, robotic turret. It integrates autonomou gimballed targeting sensors with real-time computer aided detection, recognition, and identified decreased time to engagement. It integrates target acquisition with intelligent fire control system on NGCV platforms, and enable experimentation and soldier touch-point of the system o	d						
FY 2020 Plans: Will mature synthetic, augmented, and real threat data sets to train and test automated target a variety of complex, cluttered environments. Will execute initial demonstration of advanced ATR processing in a relevant test environment using a stationary vehicle. Will develop and of integration approaches with intelligent fire control systems. Synthetic imagery development the-move target detection and recognition algorithms for a wider variety of environments. W stationary target indicators.	et recognition (ATR) algorithms in targeting sensors with embedded lemonstrate sensor and algorithm and data collections will inform on Il develop and mature moving and	-					
FY 2020 to FY 2021 Increase/Decrease Statement: ATLAS effort completes in FY20.							
Title: FY 2020 SBIR/STTR Transfer		-	1.235	-			
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:							
	monte/Planned Programe Subt	otale	27 200				
Accomplisi			27.200	-			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives	Project (Number/Name) AX8 I Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)
C. Other Program Funding Summary (\$ in Millions) N/A		
<u>Remarks</u>		
D. Acquisition Strategy		
N/A		

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	ıy								Date:	February	2020	
Appropriation/Budge 2040 / 4		R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation InitiativesProject (Number/Name) AX8 / Adv Lo 							r/Name) and Accura C)	cy Sys fo	or Med				
Management Service	es (\$ in M	illions)		FY 2019		FY 2020		FY 2021 Base		FY 2	2021 CO	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	-	-		1.235		-		-		-	0.000	1.235	-
		Subtotal	-	-		1.235		-		-		-	0.000	1.235	N/A
Product Developmer	nt (\$ in Mi	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
ALAS-MC: Procure Ammo Rounds H/W	C/Various	ARDEC : Picatinny, NJ	-	-		3.700		-		-		-	0.000	3.700	-
ALAS-MC: Control Unit	C/Various	ARDEC : Picatinny, NJ	-	-		0.300		-		-		-	0.000	0.300	-
ALAS-MC: Test Hardware	TBD	ARDEC : Picatinny, NJ	-	-		0.200		-		-		-	0.000	0.200	-
ATLAS: System Design	TBD	CERDEC : Fort Belvoir, VA	-	-		5.000		-		-		-	0.000	5.000	-
ATLAS: Artificial Intelligence/Machine Learning Development	TBD	CERDEC : Fort Belvoir, VA	-	-		6.500		-		-		-	0.000	6.500	-
ATLAS: Data Collection and Synthetic Data	TBD	CERDEC : Fort Belvoir, VA	-	-		8.065		-		-		-	0.000	8.065	-
ATLAS: Integration and Test	TBD	CERDEC : Fort Belvoir, VA	-	-		1.400		-		-		-	0.000	1.400	-
		Subtotal	-	-		25.165		-		-		-	0.000	25.165	N/A
Support (\$ in Million	s)			FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
ALAS-MC	TBD	ARDEC : Picatinny, NJ	-	-		0.800		-		-		-	0.000	0.800	-

Exhibit R-3, RDT&E	Project Co	ost Analysis: PB 2	021 Army	y								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (NoPE 0604115A / Technology MaturationAX8 / AdvInitiativesCalber (AL)					(Numbe dv Leth a ALAS-M	r/ Name) nd Accura C)	cy Sys fo	or Med	
Support (\$ in Million	s)			FY 2	2019	FY 2	:020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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	-	-		0.800		-		-		-	0.000	0.800	N/A
			Prior Years	FY 2	2019	FY 2	:020	FY 2 Ba	2021 Ise	FY : Of	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
	_	Project Cost Totals	-	-		27.200		-		-		-	0.000	27.200	N/A

Remarks

Schedule Profile: PB 2021 Army Date: February 2020													
Appropriation/Budget Activity 2040 / 4			R-1 Pro PE 0604 <i>Initiative</i>	o gram Elemer 4115A <i>I Techn</i> es	Number/Name) / Leth and Accuracy Sys for Med LAS-MC)								
Event Name	FY 2019	FY 20	20	FY 2021	FY 2022	F	Y 2023	F	Y 2024	F	Y 2025		
	1 2 3 4	1 2 3	4 1	2 3 4	1 2 3 4	1 3	2 3 4	1 :	2 3 4	1 2	3 4		
ALAS-MC: Procure Ammo Rounds H/W													
ALAS-MC: Control Unit													
ALAS-MC: Test Hardware													
ATLAS: System Design													
ATLAS: AI/ML Development													
ATLAS: Data Collection and Synthetic Data													
ATLAS: Integration and Test													

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Feb	ruary 2020							
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0604115A <i>Initiatives</i>	Element (Numbe I Technology Mat	Project (Number/Na AX8 I Adv Leth and A Calber (ALAS-MC)	me) .ccuracy Sys for Med								
Sc	chedule Detail	S										
		St	art	E	Ind							
Events		Quarter	Year	Quarter	Year							
ALAS-MC: Procure Ammo Rounds H/W		2	2020	3	2021							
ALAS-MC: Control Unit		3	2020	3	2021							
ALAS-MC: Test Hardware		3	2020	3	2021							
ATLAS: System Design		1	2020	2	2021							
ATLAS: AI/ML Development		1	2020	3	2021							
ATLAS: Data Collection and Synthetic Data		1	2020	3	2021							
ATLAS: Integration and Test		1	2020	4	2021							
Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	Army							Date: Feb	ruary 2020	
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Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 06041 ⁻ Initiatives	am Elemen 15A <i>I Techn</i>	i t (Number / ology Matur	Name) ration	Project (N AX9 I Adv Adv Tech	umber/Nai Mobility Ex	ne) perimental i	Prototype
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
AX9: Adv Mobility Experimental Prototype Adv Tech	-	0.000	10.500	15.785	_	15.785	10.490	7.193	0.000	0.000	0.000	43.968
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
capability enhancements to inform This work is coordinated with PE The cited work is consistent with Work in this Project is performed	the Under the Unit	(Next Gene Secretary of	ration Coml Defense, F J.S.) Army I	bernnendal s of record. bat Vehicle Research ar Futures Col	Advanced ⁻ nd Engineer mmand (AF	Technology ring priority f) / BG4 (Adv	v Mobility E and the Ar	xperimental	Prototype zation Stra	Adv Tech E tegy.	Demo).
B. Accomplishments/Planned P	rograms (\$ in Million	<u>s)</u>						FY	2019 I	TY 2020	FY 2021
Title: Advanced Mobility Experime	ental Proto	type								-	10.023	15.785
Description: Efforts integrate and unmanned robotic technologies in vehicles, increased maneuver spe resupply, and onboard power gen and electromagnetic armor. This e	d demonstr nto a ground eeds across eration to e effort mitiga	ate advance d combat ve s all traversa enable the ir ates risk for t	ed powertrai hicle to den able terrain, ntegration o the Self-Pro	n, power ge nonstrate re reduced fu f energy ba pelled How	eneration, ri educed perc iel demands ised capabil vitzer.	unning gear centage of n s thus exten lities such a	technologie io-go terrain ding operat s directed e	es, and for ground ion time bei nergy weap	tween oons			
FY 2020 Plans: Will fabricate powertrain, power g combat vehicle platform, minimizi system, fuel cooling, final drives, a	eneration, ng modifica and control	and running ations to sur s.	gear techn rogate struc	ologies. W sture. Will c	ill develop o develop and	designs for i I mature air	ntegration c induction/fil	nto a surro tration, exh	gate aust			
FY 2021 Plans: Will continue to develop and maturinto experimental prototype; integ	ure air indu rate higher	ction/filtratio capacity en	n, exhaust s gine and tra	system, fue ansmission	l cooling, fir as well as i	nal drives, a mproved tra	nd controls ack and sus	to integrate pension inte	e o a			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A <i>I Technology Maturation</i> <i>Initiatives</i>	Proje AX9 / Adv 7	ct (Number/I Adv Mobility Tech	Name) Experimental	Prototype
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2019	FY 2020	FY 2021
medium weight-class combat vehicle; demonstrate operational benefits combat vehicle formations.	s of leader follower autonomous capability for unman	ined			
FY 2020 to FY 2021 Increase/Decrease Statement: Planned program progression.					
Title: FY 2020 SBIR/STTR Transfer			-	0.477	-
Description: Funding transferred in accordance with Title 15 USC ?63	8				
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 Su	ıbtotals	-	10.500	15.785
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					
<u>D. Acquisition Strategy</u> N/A					

Exhibit R-3, RDT&E	Project Co	ost Analysis: PB 2	021 Arm	у								Date:	February	2020			
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Pro PE 0604 Initiative	gram El 4115A / 7 es	ement (N Technolog	umber/N ly Matura	ame) tion	Project AX9 / A Adv Teo	c t (Number/Name) Adv Mobility Experimental Prototype ech					
Management Service	es (\$ in M	illions)		FY	2019	FY 2	020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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	-	-		0.477		-		-		-	0.000	0.477	-		
		Subtotal	-	-		0.477		-		-		-	0.000	0.477	N/A		
Product Developmer	nt (\$ in Mi	illions)		FY	2019	FY 2	020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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 and Integration of Components	C/Various	GVSC : Warren, MI	-	-		0.900		6.100		-		6.100	5.000	12.000	-		
Develop air handling, cooling system, final drives & controls	C/Various	GVSC : Warren, MI	-	-		2.900		-		-		-	0.000	2.900	-		
Fabricate Powertrain Technologies	C/Various	GVSC : Warren, MI	-	-		3.400		-		-		-	0.000	3.400	-		
Fabricate Advanced Running Gear	C/Various	GVSC : Warren, MI	-	-		2.400		-		-		-	0.000	2.400	-		
Design Integration for Surrogate Platform	C/Various	GVSC : Warren, MI	-	-		0.423		-		-		-	0.000	0.423	-		
Component Fabrication	TBD	GVSC : Warren, MI	-	-		-		7.155		-		7.155	7.700	14.855	-		
Capability Demonstration	TBD	GVSC : Warren, MI	-	-		-		2.530		-		2.530	5.000	7.530	-		
	_	Subtotal	-	-		10.023		15.785		-		15.785	17.700	43.508	N/A		
			Prior Years	FY	2019	FY 2	020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
		Project Cost Totals	_	-		10.500		15.785		-		15.785	17.700	43.985	N/A		

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Army									Date:	February	2020	
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 Initiat	rogram 604115A ives	Elemen I Techn	i t (Num ology Iv	ber/Nam laturation	e)	Project (N AX9 / Adv Adv Tech	l umbe Mobilit	r/Name) ty Experim	nental F	Prototype
Event Neme	FY 2019	FY 20	20	FY	2021	F	(2022		FY 2023	F	Y 2024	F	Y 2025
Event Name	1 2 3 4	1 2 3	4	1 2	3 4	1 2	3 4	1	2 3 4	1 2	2 3 4	1 2	3 4
Initial Design, Fabrication and Integration of Components													
Demonstrate Technologies and Tele-Op capability													
Perform Design, Fab. & Int. for 850 hp Propulsion and Leader/F	ollower Capability												
Demonstrate Technologies and Leader/Follower capability													
Perform Design, Fab, & Int. of 1000 hp Prop., Adv. Susp., & Way	point Following												
Demonstrate Technologies and Waypoint Navigation capability													
Durability Test & Evaluation													
Data Analysis and Final Report													

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Feb	ruary 2020			
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Numb PE 0604115A / Technology Ma Initiatives	er/Name) aturation	Project (Number/Name) AX9 I Adv Mobility Experimental Prote Adv Tech				
S	Schedule Details						
		Start	E	ind			
Events	Quarter	Year	Quarter	Year			
Initial Design, Fabrication and Integration of Components	1	2020	3	2020			
Demonstrate Technologies and Tele-Op capability	4	2020	4	2020			
Perform Design, Fab. & Int. for 850 hp Propulsion and Leader/Follower	Capability 2	2020	3	2021			
Demonstrate Technologies and Leader/Follower capability	3	2021	4	2021			
Perform Design, Fab, & Int. of 1000 hp Prop., Adv. Susp., & Waypoint F	ollowing 1	2021	3	2022			
Demonstrate Technologies and Waypoint Navigation capability	3	2022	4	2022			
Durability Test & Evaluation	4	2022	2	2023			
Data Analysis and Final Report	3	2023	4	2023			

Exhibit R-2A, RDT&E Project Justific	cation:	PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060411 <i>Initiatives</i>	am Elemen 5A / Techno	t (Number/ blogy Matur	Name) ation	Project (N AY1 / MUN	umber/Nan 1-T Platform	ne) n Enabler	
COST (\$ in Millions)	rior ears	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
AY1: MUM-T Platform Enabler	-	0.000	7.200	4.496	-	4.496	4.196	0.000	0.000	0.000	0.000	15.892
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project will mature and demonstrate Manned Unmanned Teaming (MUMT) technologies in a realistic operating environment to drive down risk in three critical areas for ground MUMT: remote lethality, unmanned maneuver and network. These major technical hurdles will be addressed by integrating mature technologies into the MUMT Campaign of Learning through three, synergistic integration efforts: Unmanned Aerial Vehicle (UAV)/ground platform integration, a transportable MUMT simulation environment, and an advanced interface for the Warfighter.

Work within this Project supports the Army Modernization Priority for Next Generation Combat Vehicle.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the United States (U.S.) Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Unmanned Aerial Vehicle / Ground Platform Integration	-	3.886	4.496
Description: This effort matures and demonstrates in an operational environment technologies that address critical capability challenges related to the integration of UAVs and ground vehicle platforms. This effort also improves human-machine interactions through an intuitive Warfighter Machine Interface (WMI) between operators and unmanned platforms. The end state is to analyze the operational impact of multiple advanced enabling technologies to reduce risk in critical capabilities that support MUMT operations.			
<i>FY 2020 Plans:</i> Will conduct task and workflow analysis for the integration of electro-optic sensors, a communications repeater, and advanced WMI to improve situational awareness and network communications. Will select baseline platforms for the ground and aerial vehicles. Will mature the demonstrator technology by optimizing subsystem performance during hardware and software integration on the vehicle platform. Will conduct engineering demonstration of integrated technologies to validate approach prior to operational demonstrations.			
FY 2021 Plans: Will mature the required subsystems based on lessons learned from engineering demonstration and standardize interfaces for UAV to ground platform integration using simulators developed in FY20; conduct operational demonstrations with users to			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives	Project (Number/ AY1 / MUM-T Plat	Name) form Enabler	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
evaluate the effectiveness of the integrated solution against their op requirements development.	perational needs, shape future engineering work, and info	rm		
FY 2020 to FY 2021 Increase/Decrease Statement: This increase is to focus on UAV capabilities work in FY 2021.				
Title: Transportable Manned Unmanned Teaming Simulation		-	2.987	-
Description: This effort provides an immersive, transportable MUM diverse user groups to shape and inform MUMT Tactics, Technique capability to optimize Warfighter Machine Interface (WMI) implement The end state is to provide Soldiers across the fighting echelon, from the appropriate Concept of Operations (CONOPS) 7.200 for MUMT adversaries with greater lethality and force projection.	IT simulation environment in order to gather insights from es and Procedures (TTPs). Specifically, it provides the ntations and advanced payloads for multiple MUMT scena m command to end user, the requisite knowledge to form in order to operate and fight disbursed against near-peer	arios. ulate		
FY 2020 Plans: Will design and begin development of a realistic, transportable simulations conditions and modes. Will mature the simulation environment assessments to shape and inform MUMT TTPs. Will develop scenar software improvements to the WMI.	ulator to virtually assess the control vehicle layout under ent and associated technologies in preparation for user vi rrios for virtual simulation that will engage the user base o	rtual n		
FY 2020 to FY 2021 Increase/Decrease Statement: The decrease is due to the completion of the transportable simulate integration of standard user interfaces for unmanned platforms under Integration' bullet for the remainder of this project.	ors work in FY20. These simulators will be used to facilita er the 'Unmanned Aerial Vehicle (UAV) / Ground Platform	te		
Title: FY 2020 SBIR/STTR Transfer		-	0.327	-
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 Sub	totals -	7.200	4.496

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives	Project (Number/Name) AY1 / MUM-T Platform Enabler
C. Other Program Funding Summary (\$ in Millions)		
<u>Remarks</u>		
D. Acquisition Strategy		
N/A		

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budg 2040 / 4	et Activity	,				R-1 Pro PE 0604 Initiative	gram El 4115A / 7 es	ement (N Technolog	umber/N y Matura	ame) tion	Project AY1 / N	(Number 1UM-T Pla	r/ Name) htform Ena	bler	
Management Servic	es (\$ in M	illions)		FY	2019	FY 2	020	FY 2 Ba	2021 se	FY :	2021 CO	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	-	-		0.327		-		-		-	0.000	0.327	-
		Subtotal	-	-		0.327		-		-		-	0.000	0.327	N/A
Product Developme	ent (\$ in Mi	illions)		FY	2019	FY 2	020	FY 2 Ba	2021 se	FY : O	2021 CO	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
UAV / Ground Platform Integration	C/Various	TARDEC : Warren, MI	-	-		3.886		4.496		-		4.496	4.200	12.582	-
Transportable Simulator	C/Various	TARDEC : Warren, MI	-	-		2.987		-		-		-	0.000	2.987	-
		Subtotal	-	-		6.873		4.496		-		4.496	4.200	15.569	N/A
			Prior Years	FY	2019	FY 2	020	FY 2 Ba	2021 se	FY : O	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		7.200		4.496	Date: February 2020t (Number/Name) AY1 / MUM-T Platform EnablerFY 2021 BaseFY 2021 OCOFY 2021 TotalFY 2021 TotalFY 2021 baseFY 2021 CostFY 2021 CostFY 2021 CostTarget Value of ContractAward tAward DateAward CostCost To CompleteTotal CostTarget Value of ContractFY 2021 tFY 2021 DateFY 2021 OCOFY 2021 TotalFY 2021 CostTarget Value of ContractFY 2021 baseFY 2021 OCOFY 2021 TotalFY 2021 CostTarget Value of CostTarget Value of Contractfy 2021 baseFY 2021 OCOFY 2021 TotalFY 2021 CostTarget Value of Contractfy 2021 baseFY 2021 OCOFY 2021 TotalCost To Cost To CompleteTarget Value of Costfy 2021 baseFY 2021 OCOFY 2021 TotalFY 2021 Cost To Cost To CompleteTarget Value of Costfy 2021 baseFY 2021 OCOFY 2021 TotalFY 2021 Cost To Cost To CompleteTarget Value of Costfy 2021 baseFY 2021 OCOFY 2021 TotalFY 2021 Cost To Cost To CompleteTarget Value of Costfy 2021 baseFY 2021 OCOFY 2021 CostFY 2021 Cost To Cost To CompleteTotal CostTarget Value of Cost						

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	vrmy					Date: February	2020
Appropriation/Budget Activity 2040 / 4		l F	R-1 Program Elemer PE 0604115A / Techr Initiatives	nt (Number/Name nology Maturation	e) Project (N AY1 / MUI	lumber/Name) M-T Platform Ena	bler
	EV 2019	EV 202	EX 2021	EV 2022	EV 2023	EV 2024	EV 2025
Event Name	1 2 3 4	1 2 3	4 1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
UAV/Ground Platform Integration							
Transportable Simulator							

hibit R-4A, RDT&E Schedule Details: PB 2021 Army					Date: February 2020			
propriation/Budget Activity 40 / 4	R-1 Program Eleme PE 0604115A / Tech Initiatives	ent (Numbei anology Matu	r/ Name) uration	Project (Number/Name) AY1 / MUM-T Platform Enabler				
	Schedule Details							
		Sta	art		En	d		
Events	Q	luarter	Year	Q	uarter	Veer		
						rear		
UAV/Ground Platform Integration		1	2020		4	2022		

Exhibit R-2A, RDT&E Project J	ustification	: PB 2021 A	Army							Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4	ppropriation/Budget Activity 040 / 4							R-1 Program Element (Number/Name)ProjePE 0604115A / Technology MaturationAY2 /InitiativesInitiatives				
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
AY2: Army Operational Fires	-	0.000	18.900	28.372	-	28.372	38.336	10.790	0.000	0.000	0.000	96.398
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification This Project matures and demonstrates a ground-launched, treaty-compliant weapon system capable of destroying critical relocatable, time sensitive targets in contested Anti-Access/Area Denied (A2/AD) environments. Activities include system-level prototyping to extend the range of Army fires well beyond 499km to complement other fires developments. Work in this Project complements PE 0603464A (Long Range Precision Fires Advanced Technology). The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Work in this Project is performed by the United States (U.S.) Army Futures Command (AFC).												
B. Accomplishments/Planned I	Programs (\$ in Millions	s <u>)</u>						FY	2019	FY 2020	FY 2021
Title: Army Operational Fires										-	18.042	28.372
 Description: This effort matures and demonstrates a ground-launched, treaty-compliant weapon system capable of destroying critical relocatable, time sensitive targets in contested A2/AD environments. FY 2020 Plans: Will develop system architecture and interfaces; will initiate fire control software development; and perform sub-system testing and evaluation of solid rocket booster and launch platform hardware. FY 2021 Plans: Will mature fire control software development and launch platform hardware development; conduct end to end propulsion system integration and testing of developed propulsion booster system; and conduct system level critical design review (CDR) in preparation for final flight test hardware fabrication. 												
Planned program progression.												
Title: FY 2020 SBIR/STTR Trans	sfer									-	0.858	-
Description: Funding transferred	d in accorda	nce with Tit	le 15 USC î	?638								

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives	ect (Number/Name) I Army Operational Fires			
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2019	FY 2020	FY 2021
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 Su	btotals	-	18.900	28.372
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A					

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Program Element (Number/Name)Project (NPE 0604115A / Technology MaturationAY2 / ArmInitiativesInitiatives						t (Number/Name) Army Operational Fires			
Management Service	es (\$ in M	illions)		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	-	-		0.858		-		-		-	0.000	0.858	-
		Subtotal	-	-		0.858		-		-		-	0.000	0.858	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
Army Operational Fires	C/Various	AvMC : Huntsville, AL	-	-		18.042		28.372		-		28.372	52.700	99.114	-
		Subtotal	-	-		18.042		28.372		-		28.372	52.700	99.114	N/A
			Prior Years	FY	2019	FY 2	020	FY 2 Ba	2021 Ise	FY : O	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals						18.900		28.372		-		28.3/2	52.700	99.972	N/A

<u>Remarks</u>

Exhibit R-4, RDT&E Schedule Profile: PB 202	Date: February 2020							
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06 <i>Initiati</i>	rogram Elemen 604115A / Techn ives	Jumber/Name) ay Operational Fir	es		
		1						
Event Name	FY 2019	FY 202	20	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Army Operational Fires							4	

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febru	ary 2020		
ppropriation/Budget Activity 040 / 4	R-1 Progra PE 0604115 <i>Initiatives</i>	m Element (Number 5A / Technology Matu	r/Name) uration	Project (Number/Name) AY2 I Army Operational Fires			
	Schedule Deta	ails					
		Sta	art	End			
Events		Quarter		Quarter	Year		
Army Operational Fires		1	2020	4	2023		

Exhibit R-2A, RDT&E Project Ju	Date: Febr	uary 2020										
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0604115A / Technology MaturationProject (N AY3 / Stration AY3 / StrationInitiativesAY3 / Stration					lumber/Name) tegic Long Range Cannon					
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
AY3: Strategic Long Range Cannon	-	0.000	76.860	65.147	-	65.147	70.933	0.000	0.000	0.000	0.000	212.940
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project matures and integrates long-range armament technologies for both weapons and munitions to demonstrate potential deep strike objective capabilities from future cannon artillery systems. It will demonstrate revolutionary performance to support Long Range Fires by further developing, integrating, and demonstrating enhanced lethality and range extension solutions for cannon system performance with maximum effects. Strategic Long Range Cannon (SLRC) activities include integrating component technologies into sub-system and system-level experimental prototypes for novel cannon, munition, and fire control, including guidance and propulsion.

Extended Range Cannon Artillery (ERCA) activities mature, integrate, and demonstrate a novel sub-system for ammunition handling and a long-range artillery projectile to support prototyping and experimentation of a next-generation, extended range armaments system that will provide significantly increased range and accuracy without an increase in platform weight.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this Project is performed by the Unites States (U.S.) Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Strategic Long Range Cannon	-	60.696	65.147
Description: This effort will integrate and prototype subsystem technologies to further enhance range, lethality, and precision enablers for extended range cannon and munition systems.			
<i>FY 2020 Plans:</i> Will scale up cannon and projectile technology components and fabricate sub-system prototype hardware leveraging activities and information gained under 0603464A (Long Range Precision Fires Advanced Technology) / Project AE6 (Strategic Long Range Cannon Advanced Technology). Will integrate test hardware and conduct subsystem testing and experimentation.			
FY 2021 Plans: Will mature critical sub-system technologies with major engineering tests on high risk components such as the rocket motor; will conduct static warhead testing to demonstrate performance against targets of interest; will conduct system integration			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date:	ebruary 2020)				
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives	Project (Number/ AY3 / Strategic Lo	oject (Number/Name) 3 I Strategic Long Range Cannon				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021			
and technology maturation for SLRC to include designs for long lead prototype demonstrations; will scale and perform prototyping on components including of	s to be used in upcoming major system level ojective cannon, gun carriage, and test platform						
FY 2020 to FY 2021 Increase/Decrease Statement: Planned program progression.							
Title: Extended Range Cannon Artillery Autoloader		-	9.837	-			
Description: This effort matures, integrates, and demonstrates a novel technor to support the prototyping of a next-generation, extended range armaments sy and accuracy without an increase in platform weight.	logy sub-system prototype for ammunition hand stem that will provide significantly increased rar	dling nge					
<i>FY 2020 Plans:</i> Will mature and integrate ammunition handling automation technologies into a validation of performance.	sub-system prototype for demonstration and						
FY 2020 to FY 2021 Increase/Decrease Statement: ERCA Autoloader effort ends after FY20.							
Title: Extended Range Cannon Artillery Projectile		-	2.837	-			
Description: This effort integrates component technologies that provide optim payload into a long-range artillery projectile sub-system for demonstration and and prototyping of a next-generation, extended range armaments system that accuracy without an increase in platform weight.	ized range, precision, counter-measure, and experimentation. Activities support the maturat will provide significantly increased range and	on					
<i>FY 2020 Plans:</i> Will mature and integrate enabling component technologies into long-range art validate increased range, sensor optimization and integration, and improved per extended ranges in contested and Global Positioning Satellite (GPS)-denied en	illery projectile sub-system. Will demonstrate an erformance for armor and counter-battery defeat nvironments.	nd t at					
FY 2020 to FY 2021 Increase/Decrease Statement: ERCA Projectile effort ends after FY20.							
Title: FY 2020 SBIR/STTR Transfer		-	3.490	-			
Description: Funding transferred in accordance with Title 15 USC ?638							
FY 2020 Plans:							

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date:	February 2020	1		
Appropriation/Budget Activity 2040 / 4	Project (Number/Name) AY3 / Strategic Long Range Cannon					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021		
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 Subto	tals -	76.860	65.147		
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A						

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 Initiative	o gram El e 4115A / 7 es	ement (N Technolog	umber/N y Matura	ame) tion	Project (Number/Name) AY3 / Strategic Long Range Cannon				
Management Service	es (\$ in M	illions)		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	-	-		3.490		-		-		-	0.000	3.490	-
		Subtotal	-	-		3.490		-		-		-	0.000	3.490	N/A
Product Development (\$ in Millions)		FY 2019		FY 2	2020	FY 2021 Base		FY 2	2021 CO	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
Strategic Long Range Cannon	C/Various	ARDEC : Picatinny, NJ	-	-		60.696		65.147		-		65.147	71.000	196.843	-
Extended Range Cannon Artillery (ERCA) Autoloader	C/Various	ARDEC : Picatinny, NJ	-	-		9.837		-		-		-	0.000	9.837	-
Extended Range Cannon Artillery (ERCA) Projectile	C/Various	ARDEC : Picatinny, NJ	-	-		2.837		-		-		-	0.000	2.837	-
		Subtotal	-	-		73.370		65.147		-		65.147	71.000	209.517	N/A
Support (\$ in Million	s)			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
Dismounted Man-Portable Air Defense System (MANPADS) Experiment	Option/ Various	PEO M&S, PM Cruise MIssile Defense System : Huntsville, AL	-	-		-		0.000		-		0.000	-	-	-
		Subtotal	-	-		-		0.000		-		0.000	-	-	N/A
			Prior Years	FY	2019	FY 2	2020	FY 2 Ba	2021 se	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		76.860		65.147		-		65.147	71.000	213.007	N/A

Exhibit R-3, RDT&E Project Cost Analys	is: PB 2021 Army			Date:	Date: February 2020					
Appropriation/Budget Activity 2040 / 4	R-1 Program El PE 0604115A / Initiatives	R-1 Program Element (Number/Name)PrPE 0604115A / Technology MaturationAndInitiativesAnd					Project (Number/Name) AY3 / Strategic Long Range Cannon			
	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Date: February 2020										
Appropriation/Budget Activity 2040 / 4	Appropriation/Budget Activity 040 / 4							Number/Name) ategic Long Range Cannon			
	EX 0040	54.00		EX 0004	EX 0000			514 000 4	EX 0005		
Event Name	FY 2019	FY 20	20 3 4	FY 2021	FY 2022	FY 20	3 4	FY 2024	FY 2025		
Strategic Long Range Cannon Hardware Contracting Activities											
Extended Range Cannon Artillery (ERCA) Autoloader											
Extended Range Cannon Artillery (ERCA) Projectile											

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Eleme PE 0604115A / Tech Initiatives	Iram Element (Number/Name)Project (Number/Name)115A / Technology MaturationAY3 / Strategic Long Ran				
	Schedule Details					
		St	art	E	ind	
Events		St Quarter	art Year	E Quarter	ind Year	
Events Strategic Long Range Cannon Hardware Contracting Activities		St Quarter 2	art Year 2020	E Quarter 4	End Year 2022	
Events Strategic Long Range Cannon Hardware Contracting Activities Extended Range Cannon Artillery (ERCA) Autoloader		St Quarter 2 1	art Year 2020 2020	E Quarter 4 4	ind Year 2022 2020	

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation InitiativesProject DS3 / T					ject (Number/Name) 3 / Technology Maturation Initiatives			
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	
DS3: Technology Maturation Initiatives	-	91.749	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	91.749	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

<u>Note</u>

Beginning in Fiscal Year (FY) 2020, Program Element (PE) 0604115A (Technology Maturation Initiatives) / Project DS3 (Technology Maturation Initiatives) has been realigned to:

PE 0604115A Technology Maturation Initiatives:

- * Project AX3 Technology Maturation Initiatives
- * Project AX4 Computational Prototyping Environment (CPE)
- * Project AX5 Next Generation Close Combat Missile
- * Project AX6 Active Protection Systems Integration
- * Project AX7 Multi-Mission High Energy Laser (MMHEL) Sys Demo
- * Project AX8 Adv Leth and Accuracy Sys for Med Calber ALAS-MC
- * Project AX9 Adv Mobility Experimental Prototype Adv Tech
- * Project AY1 MUM-T Platform Enabler

* Project AY2 Army Operational Fires

* Project AY3 Strategic Long Range Cannon

A. Mission Description and Budget Item Justification

This Project funds the maturation, integration, and demonstration of advanced technology demonstrators and experimental prototypes to support advanced ground systems; aviation systems; command, control, communication & reconnaissance systems and equipment; precision weapons, High Energy Laser (HEL) systems; and Soldier equipment. Technology Maturation Initiative (TMI) efforts mature and integrate component technologies into early system and sub-system experimental prototypes for demonstration in relevant environments and tactical/operational scenarios, taking technologies to a goal of Technology Readiness Level (TRL) 7. Technology demonstrators and experimental prototypes are validated and transitioned to priority Army experimentation and acquisition efforts to inform requirements for future programs of record and reduce the risk of technology insertion. These efforts are typically 2-4 years in duration, and are approved by Army senior leadership based on priority and opportunity, to ensure that demonstrations have high potential for filling capability gaps and transitioning. Activities include the maturation, integration, and demonstration of HEL prototype weapons performance on a combat platform in realistic operational environments in support of the Army's objective capability for Maneuver-Short Range Air Defense (M-SHORAD). A 50 kilowatt (kW)-class laser weapon system has the potential to engage and defeat rockets, artillery, mortars (RAM), unmanned aerial systems(UASs), sensors, and optics for maneuvering brigade combat teams (BCTs). Activities also include sub-system (APS) components to provide modular and layered vehicle protection effects (hard-kill and soft-kill), enabling power projection and enhanced survivability. Computational Prototyping Environment (CPE) efforts include demonstration of physics-based, computational modeling integrated with new advances in deep learning to explore

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	February 202	0					
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives	Project (Number/Name) DS3 / Technology Maturation Initiatives					
design tradespaces and understand defeat strategies for prototype platform competition in the latter stages of technology maturation and establishing a	s. This Project provides the Army with an impro- closer alignment between Science and Technol	ved mechanism for ogy (S&T) efforts a	enabling greand distribution	ter programs.			
The cited work is consistent with the Under Secretary of Defense, Research Project is performed by the Army Futures Command (AFC); the United State ARSTRAT); and the Engineer Research and Development Center (ERDC).	and Engineering priority focus areas and the A es Army Space and Missile Defense Command,	rmy Modernization Army Forces Strate	Strategy. Wor gic Commanc	rk in this I (SMDC/			
Funding has been realigned to reflect the FY20 financial restructure and Arr	ny Modernization Priorities.						
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021			
Title: Vehicle Survivability Subsystem Demonstrator		7.373		-			
Description: The Vehicle Survivability Subsystem effort integrates and dem optimization of hull, frame, body, cab and armor technologies to achieve sur increased vehicle survivability against advanced and emerging threats.	onstrates cost effective, lightweight designs for vivability systems weight reductions of 10-15%	the and					
<i>Title:</i> Advanced Powertrain Subsystem Demonstrator		10.612	2 -	-			
Description: The Advanced Powertrain Subsystem Demonstrator effort fabre scalable combat vehicle powertrain technologies into a high power dense ar powertrain will demonstrate advancements in engine and transmission subsorder to provide an integrated advanced propulsion system.	ricates, integrates, and demonstrates next gene nd more fuel efficient combat vehicle powertrain. ystem components specific for military platforms	ration, This s in					
Title: Active Protection Systems Integration and Demonstration		7.416	6 -	-			
Description: This effort synchronizes emerging S&T products with the Vehic matures key APS technologies to a Technology Readiness Level 7 for integr It matures Modular Active Protection Framework (MAF)-compliant effectors a combat vehicles for prototype system test and demonstration. It conducts into processes that ensure safety compliance for future VPS increment upgrades	cle Protection Suite (VPS) Program of Record a ration onto current and future ground platforms. and sensors, and integrates them onto ground dependent evaluation to inform system develop s as new threats emerge.	nd nent					
Title: Multi-Mission High Energy Laser (MMHEL)		54.658		-			
Description: This effort matures and integrates a 50 kW-class laser system experimental prototype for demonstration in realistic operating environments decrease risk for future Army HEL acquisition programs, and support the future Procedures (TTPs) and Concept of Operations (CONOPS). HEL weapon sy offensive and defensive weapons at a lower cost-per-shot than current system 50 kW-class laser weapon system has the potential to engage and defeat R.	into a Stryker platform, providing a system-leve s. These demonstrations will inform requirement ure development of warfighter Tactics/Techniqu stems are expected to complement conventiona ems and without the need to stockpile ordnance. AM; Unmanned Aerial Vehicles (UAVs); sensors	I, HEL s, es/ II A s;					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020)
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation Initiatives	Project (Number/N DS3 / Technology /	Name) Maturation In	itiatives
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
and optics for maneuvering BCTs. Demonstrations will also inform potential manned aircraft. Leveraging Government investments and Industry techno HEL subsystem designs for integration into a Stryker vehicle; will conduct i experimental prototype; and will provide assessment of technical performa	Il future capability to defeat both fixed- and rotary-w logy advancements, will review and select existing ntegration and demonstration of a system-level HEI nce in an operational environment.	ng -		
Title: Next Generation Close Combat Missile		9.430	-	-
Description: The Next Generation Close Combat Missile (NG CCM) effort a multi-pulse, boost-sustain flight propulsion system providing extended ran proof-of-principle hardware into an integrated tactical-representative design overmatch of emerging threats to address near-term Warfighter needs, in a	demonstrates a prototype close combat missile wit nge and decreased time of flight. Activities mature n and demonstrate a prototype missile with lethality advance of acquisition program of record.	1		
Title: Computational Prototyping Environment		2.241	-	-
Description: The CPE effort creates an integrated, robust, and verified syst advancements in large data tradespace analytics, high-fidelity physics-bas performance computing capabilities, and inverse modeling approaches. The verification and validation of selected weapons platform variations in a way design failures, while also testing and mitigating solutions and multiple trad bearing production and manufacturing. CPE efforts facilitate rapid, accurate early performance verification of new capabilities.	stem that leverages recent Department of Defense ed modeling, deep learning techniques, high be CPE demonstrates the early developmental that accurately identifies potential performance and les in a Virtual Proving Ground (VPG) prior to cost- e, and computational prototyping in a robust VPG for	l r		
Title: FY 2018 NDAA SEC 825 MDAP Cost Overrun		0.019	-	-
Description: FY 2018 NDAA SEC 825 MDAP Cost Overrun				
	Accomplishments/Planned Programs Subto	otals 91.749	-	_
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy Activities are conducted both in-house and through competitively awarded be awarded. The Other Transaction Agreement (OTA) # W15QKN-14-9-10 MMHEL effort.	contracts using best value source selection proced 001 Initiative (Task Order) DOTC-16-01-INIT-0302 v	ures. Multiple com vill be the primary o	petitive contra contract vehic	acts will cle for the

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Initiative	o gram El 4115A / 7 es	ement (N Technolog	umber/N ay Matura	ame) tion	Project DS3 / 7	(Numbe echnolog	r/ Name) y Maturatio	on Initiati	ves
Management Service	es (\$ in M	illions)	ſ	FY 2	2019	FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2018 NDAA SEC 825 MDAP Cost Overrun	Allot	N/A : N/A	-	0.019		-		-		-		-	0.000	0.019	-
		Subtotal	-	0.019		-		-		-		-	0.000	0.019	N/A
Product Developmer	nt (\$ in M	illions)	ſ	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 O(2021 CO	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
Vehicle Survivability Subsystem Demonstrator	C/Various	Various : Various	21.814	7.373		-		-		-		-	0.000	29.187	-
Advanced Powertrain Subsystem Demonstrator	C/Various	Various : Various	26.945	10.612		-		-		-		-	0.000	37.557	-
Modular Active Protection Systems (MAPS) Demonstrations	C/Various	Various : Various	29.714	-		-		-		-		-	0.000	29.714	-
Active Protection Systems (APS) Integration	C/Various	Various : Various	-	7.416		-		-		-		-	0.000	7.416	-
Multi-Mission High Energy Laser (MMHEL)	C/Various	Various : Huntsville, AL	78.684	54.658		-		-		-		-	0.000	133.342	-
MMHEL Integration and Demonstration (CA)	C/Various	Various : Huntsville, AL	35.000	-		-		-		-		-	0.000	35.000	-
Computational Prototyping Environment	C/Various	Various : Various	1.000	2.241		-		-		-		-	0.000	3.241	-
Next Generation Close Combat Missile	C/Various	Various : Various	-	9.430		-		-		-		-	0.000	9.430	-
		Subtotal	193.157	91.730		-		-		-		-	0.000	284.887	N/A
			Prior Years	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	193.157	91.749		0.000		-		-		-	0.000	284.906	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2	Date: February 2020									
Appropriation/Budget Activity 2040 / 4	R-1 Program El PE 0604115A / Initiatives	Project (Number/Name) DS3 / Technology Maturation Initiatives								
	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2 OC	021 FY	2021 otal	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army Date: February 2020												
Appropriation/Budget Activity 2040 / 4		R-1 F PE 0 <i>Initia</i>	Program Elemen 604115A / Techn tives	t (Number/Name ology Maturation) Project (N DS3 / Teci	Project (Number/Name) DS3 / Technology Maturation Initiatives						
Event Name	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025					
Vehicle Survivability Subsystem Demonstrator	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4					
Advanced Powertrain Subsystem Demonstrator												
Active Protection Systems (APS) Integration												
MMHEL - Subsystem Design Refinement, Assembly, and Delive												
MMHEL - Firing Doctrine and Experimental Prototype System Se												
MMHEL - Experimental Prototype System Integration and Check	out											
Next Generation Close Combat Missile												
Computational Prototyping Environment												
			I	11		I						

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febr	uary 2020	
Appropriation/Budget Activity 1040 / 4	R-1 Program Ele PE 0604115A / 7 <i>Initiatives</i>	e ment (Number Fechnology Matu	r/Name) Iration	Project (Number/Name) DS3 / Technology Maturation Initiative		
	Schedule Details					
		Sta	nrt	E	nd	
Events		Quarter	Year	Quarter	Year	
Vehicle Survivability Subsystem Demonstrator		1	2017	4	2019	
Advanced Powertrain Subsystem Demonstrator		1	2017	4	2019	
Modular Active Protection Systems (MAPS) Demonstrations		1	2017	4	2018	
Active Protection Systems (APS) Integration		1	2019	4	2021	
Multi-Mission High Energy Laser (MMHEL) - System-Level Des	sign	1	2018	3	2018	
MMHEL - Subsystem Design Refinement, Assembly, and Deliv	ery	4	2018	4	2019	
MMHEL - Firing Doctrine and Experimental Prototype System S	Software	1	2019	3	2021	
MMHEL - Experimental Prototype System Integration and Chec	ckout	2	2019	4	2020	
Next Generation Close Combat Missile		1	2019	4	2021	
Computational Prototyping Environment		1	2018	4	2022	

Note

N/A

Exhibit R-2, RDT&E Budget Item	n Justificat	t ion: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)				anced	R-1 Program Element (Number/Name) PE 0604117A <i>I Maneuver - Short Range Air Defense (M-SHORAD)</i>							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	75.711	42.900	4.995	-	4.995	39.863	271.946	308.415	446.026	Continuing	Continuing
Fl4: Maneuver - Short Range Air Defense (M-SHORAD)	-	75.711	42.900	4.995	-	4.995	39.863	271.946	308.415	446.026	Continuing	Continuing

A. Mission Description and Budget Item Justification

Maneuver - Short Range Air Defense (M-SHORAD) is an Air Defense weapon system consisting of multiple ground-to-air missile launchers, sensors and a gun on a Stryker A1 combat vehicle. M-SHORAD provides the Army improved capabilities for defense of maneuver formations and other tactical echelons from low altitude air attack and surveillance. Adaptive threats have developed a suite of airborne threat capabilities, supported by an integrated mix of surface-to-air and surface-to-surface shooters that threaten the ability of maneuver forces to conduct operations. Specifically, maneuver formations require the improved M-SHORAD air defense identification and defeat capabilities to counter Fixed Wing (FW), Rotary Wing (RW), Unmanned Aircraft Systems (UAS) and Rocket, Artillery and Mortar (RAM) threats.

The M-SHORAD capability will be provided through a multi-phase approach with a rapidly fielded Initial M-SHORAD system (supported by an Army Approved Directed Requirement) and an enduring M-SHORAD (supported by a Joint Requirements Oversight Council approved Capability Development Document (CDD) that will field the full capability. First, the Army will field the Initial M-SHORAD solution based on a Fiscal Year (FY) 2018 Directed Requirement, which was informed by the FY 2017 M-SHORAD Demonstration. This system will provide the capability to identify, track, and neutralize or destroy low-altitude air threats to include FW, RW, and Group 3 UAS while keeping pace and surviving with the maneuver Brigades. The Initial M-SHORAD will be fielded to four M-SHORAD battalions. In addition, the Rapid Capabilities and Critical Technologies Office (RCCTO) will transition the Directed Energy M-SHORAD (DE M-SHORAD) to the M-SHORAD Product Office in 1 Quarter (QTR) FY 2023. DE M-SHORAD will provide the long term capability to counter a broader range of FW, RW, UAS and RAM threats.

FY 2021 to FY 2025 dollars are for the ENDURING M-SHORAD (DE M-SHORAD, Maneuver Air Defense Technologies (MAD-T) missiles and DISMOUNTED M-SHORAD) development.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 A	rmy			Date:	February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA Component Development & Prototypes (ACD&P)	4: Advanced	R-1 Program El PE 0604117A / <i>I</i>	RAD)		
B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	79.016	39.100	105.700	-	105.700
Current President's Budget	75.711	42.900	4.995	-	4.995
Total Adjustments	-3.305	3.800	-100.705	-	-100.705
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-9.700			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	13.500			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-3.305	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	-100.705	-	-100.705

Change Summary Explanation

The FY 2021 decrease of \$105.7 million was realigned within Air and Missile Defense Portfolio to support Army Modernization of National Defense Strategy to RCCTO for the Directed-Energy M-SHORAD program. \$4.995 million was reinstated in FY 2021 to the IM-SHORAD for Completing Operational Assessment Testing into 1 QTR FY 2021 and conducting Enduring M-SHORAD planning.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	Army							Date: Febr	uary 2020	
Appropriation/Budget Activity R-1 Program Element (Number/Name) Program Element (Number/Name) 2040 / 4 PE 0604117A / Maneuver - Short Range Air FI4 Defense (M-SHORAD) (M-						Project (N FI4 / Mane (M-SHORA	Project (Number/Name) 14 I Maneuver - Short Range Air Defense M-SHORAD)					
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: Maneuver - Short Range Air Defense (M-SHORAD)	-	75.711	42.900	4.995	-	4.995	39.863	271.946	308.415	446.026	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Maneuver - Short Range Air Defense (M-SHORAD) is an Air Defense weapon system consisting of multiple ground-to-air missile launchers, sensors and a gun on a Stryker A1 combat vehicle. M-SHORAD provides the Army improved capabilities for defense of maneuver formations and other tactical echelons from low altitude air attack and surveillance. Adaptive threats have developed a suite of airborne threat capabilities, supported by an integrated mix of surface-to-air and surface-to-surface shooters that threaten the ability of maneuver forces to conduct operations. Specifically, maneuver formations require the improved M-SHORAD air defense identification and defeat capabilities to counter Fixed Wing (FW), Rotary Wing (RW), Unmanned Aircraft Systems (UAS) and Rocket, Artillery and Mortar (RAM) threats.

The M-SHORAD capability will be provided through a multi-phase approach with a rapidly fielded Initial M-SHORAD system (supported by an Army Approved Directed Requirement) and an enduring M-SHORAD (supported by a Joint Requirements Oversight Council approved Capability Development Document (CDD) that will field the full capability. First, the Army will field the Initial M-SHORAD solution based on a Fiscal Year (FY) 2018 Directed Requirement, which was informed by the FY 2017 M-SHORAD Demonstration. This system will provide the capability to identify, track, and neutralize or destroy low-altitude air threats to include FW, RW, and Group 3 UAS while keeping pace and surviving with the maneuver Brigades. In addition, the Rapid Capabilities and Critical Technologies Office (RCCTO) will transition the Directed Energy M-SHORAD (DE M-SHORAD) to the M-SHORAD Product Office in 1 Quarter (QTR) FY 2023. DE M-SHORAD will provide the long term capability to counter a broader range of FW, RW, UAS and RAM threats.

FY 2021 to FY 2025 dollars are for Enduring M-SHORAD (DE M-SHORAD, Maneuver Air Defense Technologies (MAD-T) missiles and DISMOUNTED M-SHORAD) development.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2021	FY 2021
	FY 2019	FY 2020	Base	000	Total
Title: Initial M-SHORAD Materiel Development/Integration	75.711	41.565	4.995	-	4.995
Description: Develop, test and integrate the Initial M-SHORAD system.					
<i>FY 2020 Plans:</i> - Completed testing to achieve Urgent Materiel Release and Safety Certification - Completed required program documentation - Continued final prototypes					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020										
Appropriation/Budget Activity 2040 / 4	er/Name) ort Range Air	lame) Project (Number/Name) Range Air FI4 I Maneuver - Short Range Air Defense (M-SHORAD)								
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total					
 Completed Initial M-SHORAD development effort Transitioned Multi-Mission High Energy Laser (MMHEL) fro SHORAD Program of Record using the Office of the Secretar (ManTech) program 										
FY 2021 Base Plans: - Complete Operational Assessment Testing of Prototypes un - Initial Maneuver Short-Range Air Defense (IM-SHORAD) U - IM-SHORAD First Unit Equipped (FUE). - Conduct Enduring M-SHORAD planning.										
FY 2020 to FY 2021 Increase/Decrease Statement: Funding as been adjusted from FY 2020 to FY 2021 to support Operational Assessment Testing for the IM-SHORAD prototy										
Title: FY 2020 SBIR/STTR Transfer					-	1.335	-	-	-	
Description: Funding transferred in accordance with Title 15										
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										
	Accomplisi	hments/Plar	nned Progra	ams Subtota	ls 75.711	42.900	4.995	-	4.995	
C. Other Program Funding Summary (\$ in Millions)										
Line ItemFY 2019FY 2020• C14301: Maneuver - Short-233.300Range Air Defense (M-SHORAD)RemarksM-SHORAD procurement is funded through C14301. This in	FY 2021 <u>Base</u> 378.654 cludes Initial	FY 2021 <u>OCO</u> 158.300 M-SHORAD	FY 2021 <u>Total</u> 536.954 procuremen	FY 2022 330.738	FY 2023 80.412	FY 2024 - 23).	<u>FY 2025</u> -	Cost To Complete Continuing	Total Cost Continuing	

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: February 2020		
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	umber/Name)	
2040 / 4	PE 0604117A / Maneuver - Short Range Air	FI4 I Mane	uver - Short Range Air Defense
	Defense (M-SHORAD)	(M-SHORA	AD)

D. Acquisition Strategy

The acquisition approach begins with the Initial M-SHORAD. The Initial M-SHORAD uses the FY 2017 M-SHORAD Demonstration as the initial basis to identify near-term initial solutions. The Program Office uses Defense Ordnance Technology Consortium (DOTC) Other Transactional Authority (OTA) agreements for the development and purchase of nine Initial M-SHORAD prototypes according to the content of the Directed Requirement. The OTA efforts include: Mission Equipment Package (MEP) subsystems include Stinger Vehicle Universal Launcher (SVUL), Longbow Missile, EO/IR Sensor, 30 mm Cannon, FAAD-C2, and M240 machine Gun; Platform Integrator effort to procure the Stryker vehicle and integrate the MEP; and the Stinger Launcher.

Program Office will use FY 2021-2025 funds for Enduring M-SHORAD (DE M-SHORAD, MAD-T missiles and DISMOUNTED M-SHORAD) capability. The Program Office plans to award competitive contracts. In FY 2022-2025, the Program will conduct development activities, integration, component qualification, Early Warfighter Assessment, Logistics, and Safety Certifications.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (Number/Name)PE 0604117A / Maneuver - Short Range AirFI4 / Maneuver - Short Range ADefense (M-SHORAD)(M-SHORAD)								nge Air D	efense
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
Product Management	Various	Trident, Intuitive Research and others : Huntsville, Alabama	1.699	2.595	Oct 2018	1.410	Oct 2019	0.995	Oct 2019	-		0.995	0.000	6.699	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.335		-		-		-	0.000	1.335	-
	1	Subtotal	1.699	2.595		2.745		0.995		-		0.995	0.000	8.034	N/A
Product Development (\$ in Millions)		FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total]		Target		
	Contract Method	Performing	Prior		Award		Award		Award		Award	Total	Cost To	Total	Target Value of
Cost Category Item	& Type	Activity & Location	Years	Cost	Date	Cost	Date	Cost	Date	Cost	Date	Cost	Complete	Cost	Contract
Engineering and Technical Support	MIPR	Combat Capabilites Development Command : Redstone Arsenal, AL	-	1.781	Oct 2018	1.367	Oct 2019	-		-		-	0.000	3.148	-
System Development, Prototypes and Integration	C/CPIF	Defense Ordnance Technology Consortium (DOTC) (DRS Sustainment Systems, General Dynamics Land Systems and Raytheon Missile systems) : Various	64.876	56.676	Oct 2018	13.835	Oct 2019	-		-		-	0.000	135.387	-
Government Furnished Equipment (GFE)	MIPR	Program Executive Officer Missiles and Space : Various	2.374	4.522	Oct 2018	1.183	Oct 2019	-		-		-	0.000	8.079	-
		Subtotal	67.250	62.979		16.385		-		-		-	0.000	146.614	N/A
												-			

PE 0604117A: *Maneuver - Short Range Air Defense (M-SH...* Army

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Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/		R-1 Pro PE 060 Defens	o gram El o 94117A / M e (M-SHC	ement (N Maneuver DRAD)	l umber/N ⁻ - Short F	ame) Range Air	Project FI4 / Ma (M-SHC	: (Numbe aneuver - DRAD)	r/Name) Short Rar	nge Air D	efense		
Product Developme	nt (\$ in M	illions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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 Development, Pr. Package (MEP), Platform MEP is by DRS Sustainme Platform Integration is by 0 Stinger Missile Launcher is Significant GFE includes N M299 launchers are by Lo	ototypes and Integration a ent Systems General Dyn s by Raythed //299 Hellfire ckheed Mart	d Integration uses DOTC and Stinger Missile Laun (St. Louis, MO): \$54.00 amics Land Systems (Li on Missile Systems (Tus e launchers, FAAD-C2 sy tin Corp. (Orlando, FL). Jorthrop Grumman (Bed	C Other Tran cher. 08 million FY ma, OH and con, AZ): \$3 /stems and	nsactional A (19 and \$6. d Anniston, 3.881 millio radios.	400 million l AL): \$52.18 n FY19 and	「A) agreem FY20. 2 million F∖ \$2.276 mill	ents consist (19 and \$6.6 lion FY20.	ing of three	separate ef FY20.	fforts: Missi	on Equipm	ent			
Support (\$ in Million	is)			FY 2	2019	FY	2020	FY	2021 ase	FY 2	2021 CO	FY 2021 Total]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Support Costs	MIPR	Aviation and Missiles Command (AMCOM) : Redstone Arsenal, AL	0.252	3.460	Oct 2018	1.858	Oct 2019	_		-		-	0.000	5.570	-
		Subtotal	0.252	3.460		1.858		-		-		-	0.000	5.570	N/A
Test and Evaluation	(\$ in Milli	ions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
Developmental Testing	MIPR	Redstone Test Center (RTC) and White Sands Missile Range (WSMR) : Redstone, AL and WSMR, NM	-	2.448	Oct 2018	11.210	Oct 2019	-		-		-	0.000	13.658	-
Test Support	MIPR	RTC, WSMR, Target Management	-	4.229	Oct 2018	10.702	Oct 2019	4.000	Oct 2020	-		4.000	0.000	18.931	-

PE 0604117A: *Maneuver - Short Range Air Defense (M-SH...* Army

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Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budg 2040 / 4	et Activity	/				R-1 Pro PE 0604 Defense	gram El 4117A / M e <i>(M-SHC</i>	ement (N Maneuver DRAD)	umber/N - Short F	ame) Range Air	FI4 / Ma (M-SHC	t (Number aneuver - DRAD)	r/ Name) Short Ran	ge Air De	efense
Test and Evaluation	(\$ in Milli	ions)	ſ	FY 2	2019	FY 2	020	FY 2 Ba	2021 Ise	FY	2021 CO	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
		Office and others : Redstone, AL and WSMR, NM													
		Subtotal	-	6.677		21.912		4.000		-		4.000	0.000	32.589	N/A
Remarks Complete Operational Ass	essment Te	sting 1QTR in FY 2021.	Prior					FY 2	2021	FY	2021	- FY 2021	Cost To	Total	Target Value of
			Years	FY 2	2019	FY 2	020	Ba	se	000		Total	Complete	Cost	Contract
		42.900		4.995		-		4.995	0.000	192.807	N/A				
<u>Remarks</u>															

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Army														Dat	te: Fo	ebruar	y 202	20		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)ProjecPE 0604117A / Maneuver - Short Range AirFI4 / MDefense (M-SHORAD)(M-SHORAD)											Numl neuve RAD)	ber/N r - Sl	lame) hort Ra	ange	Air I	Defen	se			
	EV	2010	1	EV 20	020		EV	2021	1	EV 2	122	1	EV	0023		EV	2024		E	(202	5
Event Name	1 2	3 4	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 M-SHORAD Material Development/Integration	Initial M-SH	ORAD Materia	a Devel	lopment/lr	ntegration	E Contraction of the second seco															
Initial M-SHORAD Testing		Initial	M-SHC	DRAD Tes	ting		I														
JROC approved CDD					RAD CDD																
IM-SHORAD UMR							DRAD U	MR													
Initial M-SHORAD First Unit Equipped (FUE)					Initial N	-SHOP	RAD Fin	st Unit Equi	ipped (FU	E)											
Enduring M-SHORAD Other Transactional Authority (OTA) Awar	d								4 Endurin	g M-SH		rA Awa	rd								
Enduring M-SHORAD Design, Development, Prototype Build & I	Performan	ce Assessm	nent						E	induring	M-SHOR	UAD De	sign, De	velopment	t, Prototy	ype Buil	d & Perfo	mance	Asses	sment	
Enduring M-SHORAD FUE																				E	6 Enduri
DE M-SHORAD Transition											D	<mark>Б</mark> -М SH	ORAD T	ransition							
DE M-SHORAD Development												DE	M-SHOP	AD Devel	opemnt						

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Feb	ruary 2020			
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0604117A <i>Defense (M-S</i>)	ram Element (Number/Name)Project (Number/Name)17A I Maneuver - Short Range AirFI4 I Maneuver - Short RangeM-SHORAD)(M-SHORAD)						
	Schedule Detail	S						
		St	art	E	nd			
Events		Quarter	Year	Quarter	Year			
Directed Requirement	2	2018	2	2018				
Initial M-SHORAD Material Development/Integration		4	2018	1	2020			
Initial M-SHORAD Testing		4	2019	1	2021			
JROC approved CDD		2	2020	2	2020			
IM-SHORAD UMR		1	2021	1	2021			
Initial M-SHORAD First Unit Equipped (FUE)		1	2021	1	2021			
Enduring M-SHORAD Other Transactional Authority (OTA) Award		2	2022	2	2022			
Enduring M-SHORAD Design, Development, Prototype Build & Pe Assessment	erformance	2	2022	4	2025			
Enduring M-SHORAD FUE		4	2025	4	2025			
DE M-SHORAD Transition		1	2023	1	2023			
DE M-SHORAD Development		1	2023	4	2025			

Exhibit R-2, RDT&E Budget Item	n Justificat	i on: PB 202					Date: Febr	uary 2020				
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)						am Elemen 8A / TRAC	t (Number/ TOR BEAM					
COST (\$ in Millions)	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 - 52.894 0.000 0.000						0.000	0.000	0.000	0.000	0.000	0.000	52.894
KW0: TRACTOR BEAM - 52.894 0.000 0.000					-	0.000	0.000	0.000	0.000	0.000	0.000	52.894

A. Mission Description and Budget Item Justification

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

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	52.894	0.000	0.000	-	0.000
Current President's Budget	52.894	0.000	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-	-			
SBIR/STTR Transfer	-	-			

Exhibit R-2, RDT&E Budget Item	n Justificat	i on: PB 202	21 Army							Date: Febr	uary 2020			
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)						R-1 Program Element (Number/Name) PE 0604119A / Army Advanced Component Development & Prototyping								
COST (\$ in Millions)	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost					
Total Program Element - 0.000 117.335 170.49					-	170.490	171.933	150.439	154.432	176.584	0.000	941.213		
BR2: Advanced Component - 0.000 117.335 170.49 Development & Prototyping					-	170.490	171.933	150.439	154.432	176.584	0.000	941.213		

A. Mission Description and Budget Item Justification

The Advance Component Development & Prototype budget line includes multiple efforts across the Army's Battlefield Operational Systems necessary to evaluate integrated technologies in the most high fidelity and realistic operating environment as possible to assess the performance or cost reduction potential of advanced technology.

Projects focus on proving component and subsystem maturity prior to integration in major and complex systems and may involve risk reduction initiatives. Efforts also includes advanced technology demonstrations to expedite technology transition from the laboratory to operational use, with the goal of transitioning systems into the acquisition process within the FYDP.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	119.645	32.150	-	32.150
Current President's Budget	0.000	117.335	170.490	-	170.490
Total Adjustments	0.000	-2.310	138.340	-	138.340
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-2.310			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	138.340	-	138.340

Change Summary Explanation

Increases to the FY 2021 request supports proving component and subsystem maturity prior to integration in major and complex systems and may involve risk reduction initiatives. Efforts also includes advanced technology demonstrations to expedite technology transition from the laboratory to operational use, with the goal of transitioning systems into the acquisition process within the next five years.

Exhibit R-2, RDT&E Budget Iten	n Justificat	i on: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	anced	R-1 Program Element (Number/Name) PE 0604120A <i>I Assured Positioning, Navigation and Timing (PNT)</i>										
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	128.125	-	128.125	66.661	0.000	0.000	0.000	Continuing	Continuing
BV4: Area Protection and Alt Nav Technology Development	-	0.000	0.000	18.840	-	18.840	12.181	0.000	0.000	0.000	0.000	31.021
ED5: Assured Positioning, Navigation and Timing (PNT)	-	0.000	0.000	27.215	-	27.215	21.454	0.000	0.000	0.000	0.000	48.669
EH8: DISMOUNTED	-	0.000	0.000	13.337	-	13.337	12.446	0.000	0.000	0.000	0.000	25.783
EJ2: MOUNTED	-	0.000	0.000	68.733	-	68.733	20.580	0.000	0.000	0.000	Continuing	Continuing

Note

Program Element (PE) 0604120A restructured from PE1206120A in FY 2021.

A. Mission Description and Budget Item Justification

Assured Positioning, Navigation and Timing (A-PNT) provides Army ground maneuver forces access to assured PNT information under conditions where spacebased PNT Global Positioning System (GPS) may be limited or denied (jammed and spoofed). A-PNT products are ruggedized tactical systems that enable Army forces at echelon the ability to shoot, move, communicate, and protect their forces to penetrate and dis-integrate enemy anti-access systems, thereby allowing them to maneuver from operational and strategic distances to close with, destroy, and exploit the enemy in close and deep maneuver areas with sufficient combat power, tempo, and momentum. A-PNT addresses two critical capability gaps: Access and Integrity. Access is the ability to retrieve accurate PNT information in a contested Electronic Warfare/Cyber environment. Integrity is the ability to trust the PNT information. PNT is a critical enabler of many Army Maneuver, Fires, and Command and Control systems that are dependent on accurate Position and Timing, and a foundational Multi-Domain Battle capability to support: calibrated force posture (position and maneuver across strategic distances); multi-domain formations (operate in contested spaces against near-peer adversaries); convergence (continuous integration of capabilities in all domains). The current Global Positioning System (GPS) capability is a fixed frequency system susceptible to electronic warfare and field environments (e.g. urban, dense vegetation).

Joint Requirements Oversight Council Memo (JROCM) 049-10, dated 05 April 2010, approved the PNT Assurance Initial Capabilities Document and designated the Army as the Lead Component for Assured PNT. Army Futures Command approved the Mounted A-PNT System (MAPS) Directed Requirement (DR) on 13 January 2019. The Dismounted A-PNT System (DAPS) Directed Requirement was approved 05 April 2019. The Alternative Navigation (ALTNAV) Directed Requirement was approved in November 2019. MAPS transitions to a Capability Development Document (CDD) in June 2020 and DAPS transitions in FY 2021.

A-PNT consists of four Projects; (BV4) Area Protection and Alternative Navigation (Alt Nav) Technology Development, (ED5) Assured PNT, (EH8) Dismounted A-PNT System (DAPS), and (EJ2) Mounted A-PNT System (MAPS).

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	/			Date:	February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Component Development & Prototypes (ACD&P)	Advanced	R-1 Program E PE 0604120A /	lement (Number/Name) Assured Positioning, Nav	igation and Timing (PN	IT)
Project Manager (PM) PNT manages these four Project areas (prototype, experiment, model, assess, develop, modify, improve	Area Protection e resiliency, tes	n and Alt Nav cap st, equip, field, an	babilities, Assured PNT, D d sustain A-PNT solutions	APS, and MAPS) cons	structed to investigate,
Assured Positioning, Navigation and Timing (A-PNT) consists o	f:				
(BV4) - The Area Protection and Alt Nav Technology Developm Technology organizations, and consequent development of alter Dismounted A-PNT System (DAPS). Area Protection & Alt Nav complementary PNT, and net-enabled GPS solutions to provide	ent project sup rnative and co Technologies v Radio Freque	ports the transition mplementary PN will be developed ncy (RF) and not	on of technologies from ind T technologies for integrat in order to demonstrate A n-RF threat mitigation.	dustry, academia, and ion into Mounted A-PN Iternative Navigation (government Science & IT System (MAPS) and ALTNAV), emerging
(ED5) - The Assured PNT project funding line is for Resiliency a also supports the completion of network integration, installation	and Software A and testing of	ssurance Measu ALTNAV signal e	res (RSAM) software upgr nterprise build-out.	ades to legacy military	GPS receivers. This line
(EH8) - The Dismounted A-PNT System (DAPS) will provide the Visual Augmentation System (IVAS)) conducting operations out share data across the network and conduct mission command f	e Soldiers equi side of vehicle unctions.	pped with Nett W s, unhindered ac	arrior and other Soldier ar cess the critical timing and	chitecture compliant s I position data to effect	ystems (e.g. Integrated tively engage targets,
(EJ2) - The Mounted A-PNT System (MAPS) is a platform-mount forces the ability to move, shoot, communicate, and provide situ the MAPS is the Anti-Jam Antenna System (AJAS) which provide Radio Frequency, and alternate navigation technologies. AJAS will assist in delivering distributed assured PNT capabilities to n	nted, ruggedize lational awarer des GPS signal enables tactica nounted platfor	ed tactical PNT syness in Global Po I point protection al capabilities thro ms over time in a	ystem which provides elect sitioning System (GPS) ch and PNT Assurance in ch bugh assured signal acqui in iterative, affordable mar	tronic protection capal nallenged or denied en allenged environments sition in challenged en nner that allows for futu	pilities that provide Army vironments. Included in s through Anti-Jam, non- vironments. The AJAS ure modernization.
B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	128.125	-	128.125
Total Adjustments	0.000	0.000	128.125	-	128.125
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
Congressional Adds	-	-			
Congressional Directed Transfers	-	-			
Reprogrammings	-	-			
SBIR/STIR Transfer	-	-	400 405		400 405
Adjustments to Budget Years	-	-	128.125	-	128.125

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		[Date: February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (N PE 0604120A <i>I Assured P</i>	umber/Name) ositioning, Navigation and Timir	g (PNT)
Change Summary Explanation			
Change Summary Explanation Program Element (PE) 0604120A restructured from PE1206120A in F	FY 2021.		
PE 0604120A: Assured Positioning Navigation and Timi			
	Page 3 of 30	P 1 Line #106	561

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Army

R-1 Line #106

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060412 Navigation	am Elemen 20A / Assure and Timing	t (Number/ ed Positionii (PNT)	lumber/Name) a Protection and Alt Nav ay 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
BV4: Area Protection and Alt Nav Technology Development	-	0.000	0.000	18.840	-	18.840	12.181	0.000	0.000	0.000	0.000	31.021
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Restructured from PE 1206120A Assured Positioning, Navigation and Timing / project FJ8, beginning in FY 2021.

A. Mission Description and Budget Item Justification

The primary focus of Area Protection and Alt Nav Technology Development project is to enable the effective transition of incremental and disruptive technologies to fieldable Positioning, Navigation and Timing (PNT) solutions to pace or overmatch current and evolving threats. Program activities including advanced component development, prototyping, and demonstration will bridge the gap between advanced technology development (S&T) and system development (products). It will demonstrate military utility to enable effective transitions and synergize development across products. It will also reduce or eliminate the transition of immature technologies to the product developer that potentially contribute to cost growth, schedule delays, and performance shortfalls.

Currently, military GPS is limited to two narrow frequency bands which could be defeated by our potential enemies. Additional Radio Frequency (RF) signals such as Global Navigation Satellite Systems (GNSS) and other satellite communications (SATCOM) sources integrated into PNT products and user equipment will provide alternatives against GPS jamming through frequency and source diversity. This line supports the Alternative Navigation (ALTNAV) capability and complementary PNT technologies (such as RF and non-RF technologies). ALTNAV provides frequency and source diversity to enable Army users with accurate and trusted position and time information in GPS degraded environments. ALTNAV is an instantiation of a complementary PNT technology and will include network integration, installation and testing of the infrastructure capability and user equipment. Other efforts include the continuation of situational awareness development, spectrum modification for PNT solutions, and modeling and simulation support.

To support effective transition to Mounted Assured PNT System (MAPS) and Dismounted Assured PNT System (DAPS), while minimizing integration cost and schedule, the project will develop and deliver government-owned Modular Open System Architecture (MOSA) compliant hardware & software frameworks. Evolving standards from the PNT Reference Architecture (Software and/or Hardware) will be utilized ensuring a path to plug and play solutions. Utilization of these standards will be verified in the Modular Integration Lab. Prior to transition, prototype compliance with a modular open suite of standards architecture will be demonstrated.

The development process will leverage commercial capabilities, existing contracts, industry, academia, DoD Science & Technology and critical Soldier touchpoints in an iterative process to transition solutions into future products, concepts of operation, architectures, and platforms to assure PNT.

FY 2021 Base funds in the amount of \$18.840 million will continue prototyping and evaluation of the ALTNAV capability. Funds will additionally be used for risk reduction efforts for complementary PNT technologies, modeling & simulation, and technical & operational demonstrations.

Exhibit R-2A, RDT&E Project Justi	fication: PB	2021 Army							Date: Feb	oruary 2020	
Appropriation/Budget Activity 2040 / 4				R-1 Pi PE 06 <i>Navig</i> a	ogram Eler 04120A / As ation and Tir	nent (Numb sured Positic ning (PNT)	e r/Name) oning,	Project (N BV4 / Area Technolog	lumber/Na a Protectior ly Developr	me) n and Alt Na ment	V
B. Accomplishments/Planned Prog	<u>rams (\$ in I</u>	<u>Millions)</u>					FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Area Protection & Alt Nav Tech	nology Deve	elopment					-	-	18.840) -	18.840
Description: The effort supports AL	NAV and co	omplementar	y PNT capa	bilities.							
FY 2021 Base Plans: FY 2021 Base funds will continue pro capabilities. Funds will additionally be modeling & simulation, experimentati FY 2020 to FY 2021 Increase/Decret Restructured from PE 1206120A Ass 2021.	ototyping and e used for ris on, and used ease Statem oured Positio	l evaluation k reduction d to conduct ent: ning, Naviga	of the ALTN efforts for co a technical o tion and Tim	AV receiver i mplementar demonstratic ning / project	ntegration a y PNT techn n. FJ8, beginn	nd fusion ologies, ing in FY					
			Accomplis	hments/Plai	nned Progra	ams Subtota	ls -	-	18.840) -	18.840
C. Other Program Funding Summa	rv (\$ in Milli	ons)								1	
	., (*	<u></u>	FY 2021	FY 2021	FY 2021					Cost To	
Line Item	FY 2019	FY 2020	Base	000	Total	<u>FY 2022</u>	FY 2023	FY 2024	FY 2025	Complete	Total Cost
• EH8: DISMOUNTED	-	-	13.337	-	13.337	12.446	-	-	-	0.000	25.783
• EJ2: MOUNTED	-	-	68.733	-	68.733	20.580	-	-	-	Continuing	Continuing
AW5: Modular GPS	-	4.140	0.000	-	0.000	-	-	-	-	0.000	4.140
Independent Sensors Technology											
• AW6: Modular GPS Independent	-	-	11.089	-	11.089	10.490	9.995	12.089	14.388	0.000	58.051
Sensors Advanced Tech											
AV8: Navigation Warfare	-	5.118	2.535	-	2.535	2.044	1.998	5.968	5.968	0.000	23.631
(NAVWAR) Advanced Technology											
• 779: Command, Control And	9.195	-	0.000	-	0.000	-	-	-	-	0.000	9.195
Platform Electronics Tech											
• 101: Tactical	20.042	-	0.000	-	0.000	-	-	-	-	0.000	20.042
Command and Control											

Remarks

The primary focus of Area Protection and Alt Nav Technology Development (BV4) project is to enable the effective transition of incremental and disruptive technologies from multiple sources (commercial capabilities, industry, academia, DoD Science & Technology) to fieldable PNT solutions to pace or overmatch current and evolving threats.

PE 0604120A: Assured Positioning, Navigation and Timi... Army

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Exhibit R-2A, RDT&E Project Just	tification: PB	2021 Army							Date: Feb	oruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Pi PE 06 <i>Navig</i> a	r ogram Elei 04120A I As ation and Tii	nent (Numb sured Position ming (PNT)	er/Name) oning,	Project (BV4 / Are Technolog	Number/Na a Protection gy Developr	me) n and Alt Na ment	V			
C. Other Program Funding Summ	ary (\$ in Milli	ons)		ł				L.			
Line Herr	EV 0040		<u>FY 2021</u>	FY 2021	FY 2021	EV 0000				Cost To	Total Operat
Line item	<u>FY 2019</u>	<u>FY 2020</u>	Base	000	lotal	<u>FY 2022</u>	FY 2023	<u>FY 2024</u>	<u>FY 2025</u>	Complete	<u>Iotal Cost</u>
The project includes prototyping or	other demons	trations to p	rove out tech	nnology befo	ore it is integ	rated into a p	product. This	is solidified	by the follow	wing linkage):
 Modular GPS Independent Senso Navigation Warfare (AV8) Command, Control & Platform Ele Tactical Command and Control (1 	ors (AW5 & AW ectronics tech 01)	V6) (779)									
Linked to:											
Area Protection and Alt Nav techno	logy developn	nent (BV4)									
Linked to:											
Dismounted Assured PNT Systems Mounted Assured PNT Systems (E	s (EH8) J2)										
D. Acquisition Strategy Area Protection & Alt Nay Technology	av Developm	ent program	will utilize ra	apid prototvo	ing and mo	delina & simu	lation to ass	ess the milit	arv utilitv of	the initial ca	apabilities

Area Protection & Alt Nav Technology Development program will utilize rapid prototyping and modeling & simulation to assess the military utility of the initial capabilities through critical Soldier touchpoints, laboratory, and field assessments to determine technology maturation for integration into Mounted Assured Positioning, Navigation, and Timing System (MAPS), Dismounted Assured Positioning, Navigation, and Timing System (DAPS), and other platforms. This will be implemented by utilizing a mix of competitive Other Transaction Authority (OTA)'s and Federal Acquisition Regulation contracts to obtain prototypes. This will inform the MAPS and DAPS CDD and other requirements documents for limited rate initial production, initial operational test & evaluation, and the full rate production decision.

			у								Date:	February	2020	
tivity					R-1 Pr PE 060 <i>Naviga</i>	ogram Ele 4120A / A tion and 7	ement (N Assured F Timing (Pl	l umber/N Positioning NT)	ame) ,	Project BV4 / A Technol	(Numbe rea Prote logy Deve	r/ Name) ction and elopment	Alt Nav	
in Mi	llions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	FY 2021 Total			
tract hod ype	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
ious	Various : Various	-	-		-		0.932	Dec 2020	-		0.932	Continuing	Continuing	Continuing
	Subtotal	-	-		-		0.932		-		0.932	Continuing	Continuing	N/A
in Mil	llions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	FY 2021 Total			
tract hod ype	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
ious	Various : Various	-	-		-		1.556	Dec 2020	-		1.556	Continuing	Continuing	Continuing
ious	Various : Various	-	-		-		5.813	Dec 2020	-		5.813	0.000	5.813	-
ious	Various : Various	-	-		-		5.386	Dec 2020	-		5.386	Continuing	Continuing	Continuing
	Subtotal	-	-		-		12.755		-		12.755	Continuing	Continuing	N/A
			FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	FY 2021 Total			
tract hod ype	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
ious	C5ISR : Various	-	-		-		1.450	Nov 2020	-		1.450	Continuing	Continuing	Continuing
PFF	DCS Corporation : APG, MD	-	-		-		1.958	Dec 2020	-		1.958	Continuing	Continuing	Continuing
Į_	Subtotal	-	-		-		3.408		-		3.408	Continuing	Continuing	N/A
	in Mi ract hod /pe ous ous ous ous ous ous pe ous pe ous	in Millions) ract hod /pe Activity & Location ous Various : Various ract hod /pe Activity & Location ous Various : Various ract hod /pe Various : Various various : Various various : Various various : Various CSISR : Various PFF DCS Corporation : APG, MD Subtotal	in Millions) ract hod /pe Activity & Location Years ous Various : Various - Subtotal - n Millions) ract hod /pe Activity & Location Years ous Various : Various - ous Csipse: Various - PFF DCS Corporation : APG, MD - Subtotal -	in Millions) ract hod /pe Performing Activity & Location Prior Years Cost ous Various : Various - - Subtotal - - - n Millions) FY : - - rract hod /pe Performing Activity & Location Prior Years Cost ous Various : Various - - fract Performing Activity & Location Prior Years Cost fract Performing Activity & Location Prior Years Cost ious C5ISR : Various - - ious C5ISR : Various - - PFF DCS Corporation : APG, MD - - Subtotal - - -	In Millions) FY 2019 ract hod (pe Performing Activity & Location Prior Years Cost Award Date ous Various : Various - - Subtotal - - - n Millions) FY 2019 - - ract hod (pe Performing Activity & Location Prior Years Cost Award Date ous Various : Various - - - fract Performing Activity & Location Prior Years Cost Award Date ious C5ISR : Various - - - PFF DCS Corporation : APG, MD - - -	PE 060 Naviga in Millions) FY 2019 FY 2 ract hod Performing Activity & Location Prior Years Cost Award Date Cost ous Various : Various - - - - Subtotal - - - - - n Millions) FY 2019 FY 2019 FY 2019 FY 2019 FY 2019 ract hod Performing Activity & Location Prior Years Cost Award Date Cost ous Various : Various - - - - ous Various : Various - - - - Subtotal - - - - - ous Various : Various - - - - Subtotal - - - - - fract hod Performing Activity & Location Prior Years Cost Award Date Cost ious C5ISR : Various - - - - - PFF DCS Corporation : APG, MD - <	PE 0604120A / A Navigation and 7 In Millions) FY 2019 FY 2020 ract nod /pe Performing Activity & Location Prior Years Award Cost Award Date Award Date us Various : Various - - - Subtotal - - - n Millions) FY 2019 FY 2020 ract hod /pe Performing Activity & Location Prior Years Award Cost Award Date ous Various : Various - - - Subtotal - - - - FY 2019 FY 2020 FY 2020 - rract hod ype Performing Activity & Location Prior Years Cost Award Date Cost Performing Activity & Location Prior Years Cost Award Date Cost Corporation : APG, MD<	PE 0604120A / Assured F Navigation and Timing (P. Navigation and Timing (P. Prior ract nod performing Activity & Location Prior Years FY 2019 FY 2020 Bar Bar Award us Various : Various - - 0.932 Subtotal - - 0.932 n Millions) FY 2019 FY 2020 FY 2019 n Millions) FY 2019 FY 2020 FY 2020 n Millions) FY 2019 FY 2020 Bar ract nod Performing Activity & Location Prior Cost Award Cost us Various : Various - - - 1.556 ous Various : Various - - - 5.813 ous Various : Various - - - 12.755 FY 2019 FY 2020 Bar FY 2020 Bar ous Various : Various - - - 12.755 FY 2019 FY 2020 Bar FY 2020 Bar ract hod performing performing Prior Cost Award Cost Cost	PE 0604120A / Assured Positioning Navigation and Timing (PNT) in Millions) FY 2019 FY 2020 FY 2021 Base ract nod /pe Performing Activity & Location Prior Years Award Cost Award Date Award Cost Award Date Award Cost Award Date us Various : Various - - 0.932 Dec 2020 subtotal - - 0.932 FY 2021 n Millions) FY 2019 FY 2020 FY 2021 ract hod /pe Performing Activity & Location Prior Years Award Cost Award Date Award Cost Award Date ous Various : Various - - - 1.556 Dec 2020 ous Various : Various - - - 1.556 Dec 2020 ous Various : Various - - - 1.2755 Dec 2020 fry 2019 FY 2020 FY 2021 Base Dase FY 2021 Dase ous Various : Various - - - 1.2755 Terming fry 2019 FY 2020 FY 2020	PE 0604120A I Assured Positioning, Navigation and Timing (PNT) in Millions) FY 2019 FY 2020 FY 2021 Base FY 2021 OC ract nod ope Performing Activity & Location Prior Years Award Cost Award Date Award Cost Award Date Cost Award Date Cost us Various : Various - - 0.932 Dec 2020 - subtotal - - 0.932 Dec 2020 - n Millions) FY 2019 FY 2020 FY 2021 Base Gost Award Date Cost ract hod ous Performing Activity & Location Prior Years Cost Award Date Cost Award Date Cost Award Date Cost us Various : Various - - - 1.556 Dec 2020 - ous Various : Various - - - 5.813 Dec 2020 - us Various : Various - - - 1.556 Dec 2020 - ous Various : Various - - - 1.2755 - fract hod ppe Performing Activity & Location Prior Years Cost Award Date Cost Award Date Cost <	PE 0604120A I Assured Positioning, Navigation and Timing (PNT) BV4 I A Technol in Millions) FY 2019 FY 2020 FY 2021 Base FY 2021 OCO ract tood Activity & Location (pe Activity & Location Prior Years Cost Cost Award Date Cost Award Date Award Cost Award Date Award Cost	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	PE 0604120A I Assured Positioning, Navigation and Timing (PNT) BV4 I Area Protection and Technology Development in Millions) FY 2019 FY 2020 FY 2021 Total ract ract ract rect ract rect subtotal Prior Activity & Location Prior Years Award Cost Award Date FY 2020 FY 2021 Award Date Award Cost Award Date Cost Award Date Cost Award Date Cost Cost <td>PE 0604120A / Assured Positioning, Navigation and Timing (PNT) BV4 / Area Protection and Alt Nav Technology Development in Millions) FY 2019 FY 2020 FY 2021 FY 2021</td>	PE 0604120A / Assured Positioning, Navigation and Timing (PNT) BV4 / Area Protection and Alt Nav Technology Development in Millions) FY 2019 FY 2020 FY 2021 FY 2021

Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) DV I Area Protection and Alt Nav DV I Area Protection and Alt Nav Technology Development Test and Evaluation (\$ in Millions) FY 2019 FY 2020 FY 2021 Base Pry 2021 OCO FY 2021 Total Contract Cost Category Item Method Approximation Activity & Location Prior Total Total Target Value Cost Cost Category Item Modular Integration Lab MIPR COST Category Item Subtrat Award Ocot Award Date Cost Award Cost Award Date Cost Cost Complete Cost Cost Complete Cost Cost Complete Cost Cost Commung Continuing Continuing Continuing N/A Remarks The Technical demo includes a recurring series of data driven demonstrations and evaluations of high Technical Readiness Level (TRL) operationally effective PNT solutions Target Cost Target Cost Target Cost Continuing Continuing N/A Prior Yans FY 2019 FY 2021 FY 2021 FY 2021 Cost C	Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Army	/								Date:	February	2020	
Test and Evaluation (\$ in Millions) FY 2019 FY 2020 FY 2021 FY 2021 FY 2021 FY 2021 FY 2021 FY 2021 Total Cost Category Item MiPR Cost Cotation Performing Prior Cost Award Cost Award Cost Award Cost Cost To Total Target Contract Modular Integration Lab MIPR CSISR : Various - - 1.745 Dec 2020 - 1.745 Continuing Contract <	Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 <i>Navigat</i>	ogram Ele 4120A I A tion and T	ement (N Assured F Timing (Pl	umber/Na Positioning NT)	ame) ,	Project BV4 / A Techno	t (Numbe rea Prote logy Deve	r/ Name) ction and elopment	Alt Nav	
Cost Category Item Cost Method Method Performing Cost Category Item Performing Method Performing Network Performing Cost Award Date Award Cost Award Date Award Cost Award Date Cost To Cost To Date Total Cost Complete Total Cost Cost Total Target Value of Contract Moduction easily in order to pace/overmatch enemy PNT Inveat systems. FY 2019 FY 2021 FY 2021 FY 2021 FY 2021 Cost Total Complete Cost Total Cost Cost Total Cost Cost Total Cost Cost Total Cost Cost Total Cost Cost Total Cost N/A Moduction of the project Cost Totals - - 0.000 18.840 - 18.840 18.840 0	Test and Evaluation	(\$ in Milli	ons)	ſ	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total]		
Modular Integration Lab MIPR CSISR : Various - - - 1.745 Continuing Continu	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 - - 1.745 - 1.745 Continuing Continuing N/A Remarks The Technical demo includes a recurring series of data driven demonstrations and evaluations of high Technical Readiness Level (TRL) operationally effective PNT solutions Solutional N/A Remarks Prior FY 2019 FY 2021 FY 2021 FY 2021 FY 2021 Cost To Total Total Continuing Continuing N/A Remarks Prior FY 2019 FY 2020 Base OCO FY 2021 FY 2021 Cost Total Total Cost Total Continuing Continuing N/A	Modular Integration Lab	MIPR	C5ISR : Various	-	-		-		1.745	Dec 2020	-		1.745	Continuing	Continuin	Continuing
Remarks The Technical demo includes a recurring series of data driven demonstrations and evaluations of high Technical Readiness Level (TRL) operationally effective PNT solutions that transition to production easily in order to pace/overmatch enemy PNT threat systems. Prior FY 2021 FY 2021 FY 2021 Cost To Total Target Value of Contract Prior FY 2019 FY 2020 Base OCO FY 2021 Cost To Continuing Contract Contract Continuing Continuing Continuing N/A Remarks - 0.000 18.840 - 18.840 Continuing N/A			Subtotal	-	-		-		1.745		-		1.745	Continuing	Continuing) N/A
Project Cost Totals - 0.000 18.840 - 18.840 Continuing N/A				Prior Years	FY 2	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Remarks			Project Cost Totals	-	rrs FY 2019				18.840		-		18.840	Continuina	Continuin	N/A

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Army								Date: February	2020
Appropriation/Budget Activity 2040 / 4				R-1 PE 0 <i>Navi</i>	Program Elemen 0604120A / Assure igation and Timing	i t (Number/Name ed Positioning, g (PNT)	e)	Project (N BV4 / Area Technolog	lumber/Name) a Protection and a y Development	Alt Nav
Event Name	F	Y 2019	FY 20	020	FY 2021	FY 2022	ļ	FY 2023	FY 2024	FY 2025
	1 2	2 3 4	1 2 3	3 4	1 2 3 4	1 2 3 4	1	2 3 4	1 2 3 4	1 2 3 4
ALTNAV Receiver Development										
		Alt Nav Receiv	er Development							
Complementary PNT Modeling & Simulation, and Experimentat	ion	Complementer	PNT Modeling	8 Simula	ton and Experimentation					
PNT Technical Domonstrations & Testing		Complemental	y i wi wodening i		ton, and Experimentation					
			Tech Demonstra	ations & 1	Testing					
Modular Opens Systems Architecture, PNT Operating System &										
					MoGIS, PntOS, CMOSS					

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army		·		C	Date: Febr	uary 2020
ppropriation/Budget Activity D40 / 4	R-1 Program E PE 0604120A / Navigation and	lement (Numbe Assured Positior Timing (PNT)	r/Name) ning,	Project (Nu BV4 / Area F Technology	mber/Nam Protection Developm	ne) and Alt Nav ent
Sc	hedule Details					
		Sta	art		Er	nd
Events		Quarter	Year	Qu	larter	Year
ALTNAV Receiver Development		2	2019		4	2022
Complementary PNT Modeling & Simulation, and Experimentation		2	2019		4	2022
PNT Technical Demonstrations & Testing		1	2020		4	2022
Madular Orange Systems Architecture, DNT Orangting Systems & CMOSS		4	0004			

Exhibit R-2A, RDT&E Project Ju	ibit R-2A, RDT&E Project Justification: PB 2021 Army											
Appropriation/Budget Activity 2040 / 4	Appropriation/Budget Activity 2040 / 4 Prior						t (Number/ d Positionii (PNT)	Name) ng,	Project (N ED5 I Assu Timing (PN	umber/Nan ured Positio IT)	ne) ning, Naviga	ation and
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2024	FY 2025	Cost To Complete	Total Cost	
ED5: Assured Positioning, Navigation and Timing (PNT)	-	0.000	0.000	27.215	-	27.215	21.454	0.000	0.000	0.000	0.000	48.669
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is not a new start project. Program Element (PE) 0604120A project ED5 transitions from PE 1206120A project FJ8 Assured Positioning, Navigation and Timing beginning in FY 2021.

A. Mission Description and Budget Item Justification

The Assured Positioning, Navigation and Timing (PNT) project funds the Resiliency and Software Assurance Measures (RSAM) which provides increased capability and situational awareness for 500,000+ fielded legacy military Global Positioning System (GPS) receivers supporting systems and soldiers through at least 2035. Legacy GPS receivers targeted for RSAM enhancements, include but are not limited to, 226,000 Defense Advanced GPS Receiver (DAGR) and 200,000+ embedded Ground Based-GPS Receiver Applications Module (GB-GRAM). RSAM mitigates risks in a GPS-challenged operational environment until future Positioning, Navigation and Timing (PNT) solutions are fully deployed. Assured PNT enablers include prototype development and testing to demonstrate and prove emerging capabilities for legacy and future PNT resilient solutions. Assured PNT enablers also include the final phase of Alternative Navigation signal enterprise build-out, providing PNT data in a denied or degraded environment.

FY 2021 base funds in the amount of \$27.215 million support PNT software enhancements to Army PNT receivers and capabilities. RSAM will support continued software development of RSAM Update 2 against emerging threats to legacy military GPS receivers, to include prototype testing and risk mitigation efforts. RSAM will coordinate integrated software testing with military system managers and the test community to validate software and synchronize RSAM deployment to the user. Assured PNT enablers include the final phase of network integration, installation and testing of Alternative Navigation signal enterprise build-out.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2021	FY 2021
	FY 2019	FY 2020	Base	000	Total
Title: Resiliency and Software Assurance Measures (RSAM)	-	-	20.852	-	20.852
Description: Funding supports the following efforts:					
FY 2021 Base Plans: FY 2021 base funds in the amount of \$20.852 million will support the release of RSAM GB-GRAM Update 1, support continued software development of RSAM DAGR Update 2 and RSAM GB-GRAM Update 2, to include prototype testing, formal qualification testing, and risk mitigation efforts. RSAM DAGR and GB-GRAM					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	R-2A, RDT&E Project Justification: PB 2021 Army									
Appropriation/Budget Activity 2040 / 4	R-1 Pro PE 060 <i>Naviga</i> t	ogram Eler 04120A I As tion and Tir	nent (Numbe sured Positio ning (PNT)	er/Name) ning,	Project (N ED5 / Ass Timing (Pl	lumber/Na ured Positic NT)	me) oning, Navig	ation and		
B. Accomplishments/Planned Programs (\$ in Millions)				FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total		
receiver integration testing efforts for Update 2 will be performed in association and systems.	ion with rele	evant milita	ry vehicles							
FY 2020 to FY 2021 Increase/Decrease Statement: Program Element (PE) 0604120A project ED5 transitions from PE 1206120A RDT&E funding decreased from \$21.992 million in FY 2020 to \$20.852 millio										
Title: Assured PNT Enablers		-	-	6.363	3 -	6.363				
Description: Funding supports the following efforts:										
<i>FY 2021 Base Plans:</i> FY 2021 base funds in the amount of \$6.363 million will support the complete installation and testing of Alternative Navigation signal enterprise build-out. <i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> Program Element (PE) 0604120A project ED5 transitions from PE 1206120A to support the final phase of ALT NAV Enterprise Buildout. RDT&E funding of EX 2020 to \$6.363 million in EX 2021										
	onts/Plan	ned Progra	ams Subtotal	le _		27 215	5 -	27 215		
Accompliant		lica i logit		5		27.210		21.210		
C. Other Program Funding Summary (\$ in Millions) FY 2021	FY 2021	<u>FY 2021</u>					<u>Cost To</u>			
Line Item FY 2019 FY 2020 Base • K49010: Mounted/ - 1.724 5.894 Dismounted Receivers - 1.724 5.894	<u>FY 2023</u> 7.075	<u>FY 2024</u> 2.370	<u>FY 2025</u> 2.394	Continuing	Total Cost Continuing					
<u>Remarks</u> K49010 / Mounted/Dismounted Receivers is an OPA subset of Line Item Nu	oning, Navig	ation and T	iming.							
D. Acquisition Strategy				<i>.</i>						

Positioning, Navigation and Timing (PNT) Resiliency and Software Assurance Measures (RSAM) will provide software improvements to legacy military GPS receivers by awarding contracts to the original equipment manufacturers and industrial partners and leveraging the test community to develop and characterize prototypes and final software solutions. PNT Enablers will utilize a mix of competitive Other Transaction Authority (OTA)'s, Federal Acquisition Regulation contracts, and other contract vehicles to partner with industry to define, develop, procure and test prototypes to determine technologies for future PNT solutions.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	y								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 <i>Naviga</i>	ogram El 4120A / A tion and 7	ement (N Assured F Fiming (Pl	lumber/N Positioning NT)	ame) 1,	Project ED5 / A Timing	(Number ssured Po (PNT)	r/ Name) ositioning,	Navigati	on and
Management Service	es (\$ in M	lillions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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 Management Support	Various	Various : Various	2.693	-		-		1.475	Nov 2020	-		1.475	0.000	4.168	-
		Subtotal	2.693	-		-		1.475		-		1.475	0.000	4.168	N/A
Product Developmer	nt (\$ in M	illions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
RSAM - DAGR Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	3.643	-		-		3.201	Nov 2020	-		3.201	0.000	6.844	-
RSAM - GB-GRAM Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	7.286	-		-		5.671	Nov 2020	-		5.671	0.000	12.957	-
Assured PNT Enablers	Various	Various : Various	0.476	-		-		6.363	Nov 2020	-		6.363	0.000	6.839	-
RSAM - MicroGRAM Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	-	-		-		3.427	Dec 2020	-		3.427	0.000	3.427	-
		Subtotal	11.405	-		-		18.662		-		18.662	0.000	30.067	N/A
Support (\$ in Million	s)			FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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 Technical Contracting Services	C/FFP	DCS Corp : APG, MD	9.445	-		-		2.502	Jan 2021	-		2.502	0.000	11.947	-
Engineering and Technical Government Services	MIPR	Various : Various	2.057	-		-		0.358	Dec 2020	-		0.358	0.000	2.415	-
		Subtotal	11.502	-		-		2.860		-		2.860	0.000	14.362	N/A
PE 0604120A: Assured Army	0604120A: Assured Positioning, Navigation and Timi					ICLASS Page 13	SIFIED of 30		R	-1 Line #	106				571

Exhibit R-3, RDT&E	nibit R-3, RDT&E Project Cost Analysis: PB 2021 Army													2020	
Appropriation/Budge 2040 / 4	ppropriation/Budget Activity 040 / 4							ement (N Assured F Timing (Pl	umber/N Positioning NT)	ame) 1,	Project ED5 / A Timing	(Number ssured Po (PNT)	/ Name) ositioning,	Navigati	on and
Test and Evaluation	(\$ in Milli	ons)		FY 2	2019	FY 2	:020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
RSAM - Government Engineering Support	MIPR	Various : Various	2.827	-		-		0.676	Mar 2021	-		0.676	0.000	3.503	-
RSAM - Contractor Engineering Support	Various	DCS Corp : APG, MD	1.278	-		-		0.648	Mar 2021	-		0.648	0.000	1.926	-
Platform Integration Testing	Various	Various : Various	3.675	-		-		2.574	Mar 2021	-		2.574	0.000	6.249	-
RSAM Test Equipment	Various	Various : Various	0.250	-		-		0.320	Mar 2021	-		0.320	0.000	0.570	-
		Subtotal	8.030	-		-		4.218		-		4.218	0.000	12.248	N/A
Prior Years			Prior Years	FY 2	2019	FY 2	020	FY 2 Ba	2021 Ise	FY : O	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
	33.630	-		0.000		27.215		-		27.215	0.000	60.845	N/A		

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Army								Date	e: February	2020	
Appropriation/Budget Activity 2040 / 4			R-1 Pr PE 060 <i>Naviga</i>	r ogram 04120 <i>F</i> ation ar	Elemen A Assure d Timing	t (Number/l ed Positionir g (PNT)	Name) ng,	Project (N ED5 / Ass Timing (P	lumb ured NT)	er/Name) Positioning,	Navigati	on and
EventNeme	FY 2019	FY 20	20	FY	2021	FY 202	22	FY 2023		FY 2024	FY	2025
	1 2 3 4	1 2 3	3 4	1 2	3 4	1 2 3	4 1	2 3 4	1	2 3 4	1 2	3 4
RSAM - Update 1	RSAM Update 1											
DAGR Software Development and Testing Update 1	RSAM DAGR Developme	nt Update 1										
GB-GRAM Software Development and Testing Update 1	GB-GRAM Software Deve	lopment and Tes	sting									
Platform Integration Testing Update 1	Platform Integration Testi	ng Update 1										
RSAM DAGR Software Release Update 1			DAGR U	pdate 1 Re	ease							
RSAM GB-GRAM Update 1 Software Release			c	2 3B-GRAM	Jpdate 1 Rele	ase						
RSAM Update 2	RS/	M Update 2										
RSAM DAGR Software Development and Testing Update 2		RSAM DA	GR Develo	pment Upd	ste 2							
RSAM GB-GRAM Software Development and Testing Update	2		RSAM G	B-GRAM [evelopment	Jpdate 2						
RSAM - MicroGRAM Software Development and Testing			RSAM	/icroGRAM	Software Dev	relopment						
Platform Integration Testing Update 2			Platform	Integratio	n Testing Upo	ste 2						
RSAM DAGR Update 2 Software Release							DAGR Upda	te 2 Release				
RSAM GB-GRAM Update 2 Software Release							GB-(4 GRAM Update 2 F	elease			

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Army				Date: February 2020				
Appropriation/Budget Activity 2040 / 4			R-1 Pro PE 060 <i>Naviga</i>	ogram Elemen 04120A / Assure tion and Timing	Project (N ED5 / Ass Timing (Pl	Number/Name) sured Positioning, Navigation and NT)			
	1								1
Event Name	FY 2019	FY 202	20	FY 2021	FY 2022	I	FY 2023	FY 2024	FY 2025
	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1	2 3 4	1 2 3 4	1 2 3 4
RSAM MicroGRAM Software Release						м	5 icroGram Release		
RSAM DAGR and GB-GRAM Post Software Release Support									
			Post	Software Release Sup	port				
Assured PNT Enablers	Assured PNT Enablers								

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Feb	ruary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program E PE 0604120A / Navigation and	Element (Numbe Assured Positio Timing (PNT)	Project (Number/Name) ED5 I Assured Positioning, Navigation and Timing (PNT)			
	Schedule Details	i				
	Γ	Si	tart	E	nd	
Events		Quarter	Year	Quarter	Year	
RSAM - Update 1		1	2019	2	2021	
DAGR Software Development and Testing Update 1		1	2018	1	2020	
GB-GRAM Software Development and Testing Update 1		1	2019	3	2020	
Platform Integration Testing Update 1		1	2019	2	2021	
RSAM DAGR Software Release Update 1		4	2020	4	2020	
RSAM GB-GRAM Update 1 Software Release		2	2021	2	2021	
RSAM Update 2		4	2019	2	2023	
RSAM DAGR Software Development and Testing Update 2		2	2020	2	2022	
RSAM GB-GRAM Software Development and Testing Update 2		4	2020	4	2022	
RSAM - MicroGRAM Software Development and Testing		4	2020	4	2022	
Platform Integration Testing Update 2		4	2020	3	2023	
RSAM DAGR Update 2 Software Release		1	2023	1	2023	
RSAM GB-GRAM Update 2 Software Release		2	2023	2	2023	
RSAM MicroGRAM Software Release		2	2023	2	2023	
RSAM DAGR and GB-GRAM Post Software Release Support		4	2020	4	2025	
Assured PNT Enablers		1	2019	4	2022	
			1	1		

575

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060412 Navigation	am Elemen 20A / Assure and Timing	t (Number/ d Positionii (PNT)	Project (N EH8 / DISI	o ject (Number/Name) 8 <i>I DISMOUNTED</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
EH8: DISMOUNTED	-	0.000	0.000	13.337	-	13.337	12.446	0.000	0.000	0.000	0.000	25.783
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is not a new start project. Program Element (PE) 0604120A project EH8 transitions from PE1206120A project FJ9 beginning in FY 2021.

A. Mission Description and Budget Item Justification

Dismounted Assured PNT (A-PNT) System (DAPS) implements congressional and OSD guidance to develop and field Military Code (M-Code) Ground User Equipment (MGUE) receivers and provides the Soldiers equipped with Nett Warrior (NW) and other Soldier architecture compliant systems (e.g. Integrated Visual Augmentation System (IVAS)) the critical timing and position data to effectively engage targets, share data across the network, and conduct mission command functions. DAPS is planned to be a size, weight and power (SWaP) optimized form-factor that paces the threats and includes development and integration of Global Positioning System (GPS) and non-GPS sensors. DAPS integrates with the NW system and other Soldier architecture compliant systems, and distributes PNT information to the End-User Device (EUD). DAPS includes receiver software capable of fusing sensors and Global Navigation Satellite Systems (GNSS) signals resulting in additional integrity for military GPS in denied environments and includes a M-Code receiver solution, or a Selective Availability Anti-Spoofing Module (SAASM) system with growth path to M-Code.

Through an iterative approach, DAPS will continue to fuse M-Code, GNSS, and non-GPS sensors, as well as fuse Alternate Navigation (ALTNAV) and other complementary PNT sources in a SWaP constrained system in order to pace/overmatch the threat and continue to deliver critical timing and position data to effectively engage targets, share data across the network, and conduct mission command functions.

FY 2021 Base funds in the amount of \$13.337 Million will continue current DAPS prototype variants, followed by final acceptance testing and certification. Funds will converge ALTNAV and complementary PNT hardware and software for planned and emerging DAPS improvements.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2021	FY 2021
	FY 2019	FY 2020	Base	000	Total
Title: Dismounted A-PNT System (DAPS)	-	-	13.337	-	13.337
Description: This effort supports the development and delivery of DAPS prototypes for integration, assessment and performance testing.					
FY 2021 Base Plans:					

Exhibit R-2A, RDT&E Project Justi		Date: February 2020										
Appropriation/Budget Activity 2040 / 4	Budget ActivityR-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)Project (Num EH8 / DISMO									umber/Name) 40UNTED		
B. Accomplishments/Planned Prog	grams (\$ in N	<u>lillions)</u>					FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	
FY 2021 Base funds in the amount o final acceptance testing and certifica software for planned and emerging D	f \$13.337 Mil tion. Funds w)APS improve	lion will cont ill converge ements.	inue current ALTNAV an	DAPS proto	otype variant entary PNT h	s, followed by ardware and						
FY 2020 to FY 2021 Increase/Decre Program Element (PE) 0604120A pro Funding decreased from PE1206120 on Program Element (PE) 0604120A into production.												
			Accomplisi	nments/Plar	nned Progra	ms Subtotals	- 3	-	13.337	-	13.337	
C. Other Program Funding Summa	nry (\$ in Millio	ons <u>)</u>	FY 2021	FY 2021	FY 2021				^	Cost To		
Line Item	<u>FY 2019</u>	FY 2020	Base	000	Total	FY 2022	FY 2023	FY 2024	<u>FY 2025</u>	Complete	Total Cost	
K49020: Dismounted Hub	-	-	48.449	-	48.449	49.570	26.458	6.063	3.960	Continuing	Continuing	
 BV4: Area Protection and Alt Nav Technology Development 	-	-	18.840	-	18.840	12.181	-	-	-	0.000	31.021	
<u>Remarks</u>												

K49020 / Dismounted Hub is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

Risk reduction prototyping efforts from 0604120A BV4 Area Protection and Alt Nav Technology Development will transition PNT Modernization/complementary PNT capabilities to the Dismounted A-PNT System (DAPS).

D. Acquisition Strategy

The DAPS strategy consists of the continuous refinement of the current DAPS material solution through an operational approach that incorporates congressionally and OSD mandated transition to M-Code and includes minimizing risk to the operational force by delivering the best available technology to fulfill critical capability gaps that outpace emerging threat environments. DAPS will provide the Soldier conducting operations outside of vehicles the means to maintain accurate position, velocity, and time information in a Global Positioning System (GPS) challenged or degraded/denied environments where space based PNT may be limited or denied. DAPS will provide improved performance over the currently fielded Defense Advanced GPS Receiver (DAGR).

DAPS will use an iterative acquisition approach and is structured to incrementally develop, deliver and field DAPS capabilities through continued development of emerging technologies. Follow-on capabilities will build on the previous technology and incorporate complementary PNT technologies as they mature. This "buildingblock" approach will continue until DAPS capabilities fully meet the requirements.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0604120A / Assured Positioning,	EH8 / DISA	MOUNTED
	Navigation and Timing (PNT)		

The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units. This will be implemented by utilizing Other Transaction Authority (OTA) agreements and/or other FAR based mechanisms to competitively obtain prototypes. The Government will conduct laboratory, performance and field testing. The findings from these efforts will provide technology viability and allow for the transition to limited production. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020			
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Pr PE 060 <i>Naviga</i>	ogram El 04120A / A tion and T	ement (N Assured F Timing (P	lumber/Na Positioning NT)	ame) 1,	Project EH8 / <i>L</i>	(Number NSMOUN	r/ Name) TED				
Management Service	es (\$ in M	illions)		FY	2019	FY	2020	FY : Ba	2021 ase	FY 2	2021 CO	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 Management Support - Contractor	Various	Various : Various	-	-		-		0.618	Dec 2020	-		0.618	Continuing	Continuing	-		
		Subtotal	-	-		-		0.618		-		0.618	Continuing	Continuing	N/A		
Product Developmen	nt (\$ in M	illions)		FY	2019	FY	2020	FY : Ba	2021 ase	FY 2 O	2021 CO	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		
DAPS Prototyping	MIPR	Various : Various	-	-		-		9.373	Dec 2020	-		9.373	Continuing	Continuing	-		
Engineering and Technical Product Development	MIPR	C5ISR : APG, MD	-	-		-		1.850	Dec 2020	-		1.850	0.000	1.850	-		
		Subtotal	-	-		-		11.223		-		11.223	Continuing	Continuing	N/A		
Support (\$ in Millions	5)			FY	2019	FY	2020	FY : Ba	2021 ase	FY 2	2021 CO	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 Technical Services - Government	Various	C5ISR : Various	-	-		-		0.353	Nov 2020	-		0.353	Continuing	Continuing	-		
Engineering and Technical Services - Contractor	C/CPFF	DCS Corporation : APG, MD	-	-		-		0.381	Dec 2020	-		0.381	Continuing	Continuing	-		
		Subtotal	-	-		-		0.734		-		0.734	Continuing	Continuing	N/A		
Test and Evaluation ((\$ in Milli	ons)		FY	2019	FY	2020	FY : Ba	2021 ase	FY 2	2021 CO	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 Evaluations	MIPR	Various : Various	-	-		-		0.762	Dec 2020	-		0.762	0.000	0.762	-		
		Subtotal	-	-		-		0.762		-		0.762	0.000	0.762	N/A		

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	Date:	Date: February 2020											
Appropriation/Budget Activity 2040 / 4	R-1 Pro PE 0604 Navigat	R-1 Program Element (Number/Name) PE 0604120A I Assured Positioning, Navigation and Timing (PNT)Project EH8 I						(Number/Name) ISMOUNTED					
Prior Years FY 2019					020	FY 2 Ba	:021 se	FY 2 OC	021 O	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		0.000		13.337		-		13.337	Continuing	Continuing	N/A		

Remarks



Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Numbe PE 0604120A <i>I Assured Positio</i> <i>Navigation and Timing (PNT)</i>	Project (Number/Name) EH8 / DISMOUNTED			
Sch	edule Details				
	St	art	E	nd	
Events	Quarter	Year	Quarter	Year	
DAPS Prototyping & Delivery	2	2019	2	2021	
DAPS Nett Warrior Integration	4	2019	4	2022	
DAPS Prototyping Operational Technical Demonstration (OTD)	3	2020	3	2020	
DAPS Capability Development Document (CDD)	3	2021	3	2021	
DAPS Milestone C Production Decision	3	2021	3	2021	
DAPS Low Rate Initial Production	3	2021	3	2022	
DAPS Initial Operational Test & Evaluation	3	2022	4	2022	
DAPS Production & Fielding	4	2022	4	2025	
DAPS Complementary PNT Prototyping	2	2020	2	2022	
DAPS ALTNAV Handheld Prototyping	2	2020	3	2022	
DAPS Complementary & ALTNAV Handheld Production & Fielding	4	2021	4	2026	

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy						Date: February 2020			
Appropriation/Budget Activity 2040 / 4						am Elemen 20A / Assure and Timing	t (Number/ ed Positionii (PNT)	Name) ng,	Project (Number/Name) EJ2 / MOUNTED			
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
EJ2: MOUNTED	-	0.000	0.000	68.733	-	68.733	20.580	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is not a new start project. Program Element (PE) 0604120A Project EJ2 transitions from PE1206120A, combining Project FK2 Mounted and Project FK3 Anti-Jam Antenna for the MAPS systems in FY 2021.

A. Mission Description and Budget Item Justification

Mounted Assured Positioning, Navigation and Timing System (MAPS) implements congressional and OSD guidance to develop and field M-code Ground User Equipment (MGUE) receivers and provides the Army's ground maneuver forces access to assured PNT information under conditions where space-based PNT Global Positioning System (GPS) may be limited or denied. A-PNT products are ruggedized tactical systems which provides electronic protection capabilities that enable Army forces the ability to move, shoot, communicate, and provide situational awareness in Global Positioning System (GPS) challenged or denied environments. MAPS addresses two critical capability gaps: Access and Integrity. Access is the ability to retrieve PNT information in a contested Electronic Warfare/Cyber environment. Integrity is the ability to trust the PNT information. PNT is a critical enabler of many Army Maneuver, Fire and Command and Control systems that are dependent on accurate Position and Timing. Included in the MAPS is the Anti-Jam Antenna System (AJAS) which provides GPS signal point protection. The AJAS will assist in delivering distributed assured PNT capabilities to mounted platforms over time in an iterative, affordable manner that allows for future modernization.

FY 2021 Base dollars in the amount of \$68.733 million support system engineering and management support, integration, testing and training of the MAPS capability for client platforms.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Mounted A-PNT System (MAPS)	-	-	68.733	-	68.733
Description: This effort supports development of and documentation for client platform integration, technical data packages for Mounted Assured Positioning, Navigation, and Timing (PNT) System (MAPS) in preparation for Initial Operational Test and Evaluation. Early integration will accelerate Full Rate Production fielding.					
FY 2021 Base Plans: FY 2021 Base dollars in the amount of \$68.733 million support system engineering and management support, integration, testing and training of the MAPS capability for client platforms.					
FY 2020 to FY 2021 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020											
Appropriation/Budget Activity 2040 / 4	R-1 Pr PE 06 <i>Naviga</i>	ogram Eler 04120A / As ation and Tin	nent (Numbe sured Positior ning (PNT)	Project (N EJ2 / MOL	Project (Number/Name) EJ2 / MOUNTED						
B. Accomplishments/Planned Proc	grams (\$ in N	<u>lillions)</u>				FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	
Program Element (PE) 0604120A pro Funding increased from PE1206120, 2021. The increase is due to Progra combining Projects FK2 Mounted an											
			Accomplis	hments/Plar	nned Progra	ms Subtotals	s -	-	68.733	- 3	68.733
C. Other Program Funding Summa	ry (\$ in Milli	ons)									
			<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>					Cost To	
Line Item	<u>FY 2019</u>	FY 2020	Base	<u>0C0</u>	<u>Total</u>	FY 2022	FY 2023	FY 2024	FY 2025	<u>Complete</u>	Total Cost
• BV4: Area Protection and Alt Nav Technology Development	-	41.728 -	80.585 18.840	12.300 -	93.151 18.840	12.181	-	94.775 -	97.800 -	0.000	31.021
<u>Remarks</u>											

K49030 / Mounted Hub A-PNT is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

Risk reduction prototyping efforts from 0604120A BV4 Area Protection and Alt Nav Technology Development will transition PNT Modernization/complementary PNT capabilities to the Mounted A-PNT System (MAPS).

D. Acquisition Strategy

The MAPS acquisition strategy consists of the continuous refinement of the current MAPS material solution through an operational approach that incorporates congressionally and OSD mandated transition to M-code and includes minimizing risk to the operational force by delivering the best available technology to fulfill critical capability gaps that outpace emerging threat environments. The MAPS program will utilize the iterative approach by continuous frontloading of operational assessments, Soldier touchpoints, and evaluations to finalize decisions for the MAPS material solution to one vendor design. MAPS is leveraging competitive Other Transaction Authority (OTA) agreements to prototype and assess industry capabilities. MAPS will conduct Electromagnetic Interference and Environmental Testing, as well as performance testing in the System Integration Lab (SIL), anechoic chamber testing and an Operational Technical Demonstration in the most affordable manner that allows for future modernization. Both the Capability Development Document and the Basis of Issue Plan will be approved in FY2020.

Exhibit R-3, RDT&E F	vroject C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name)ProjectPE 0604120A / Assured Positioning, Navigation and Timing (PNT)EJ2 / N					Project EJ2 / M	: (Number/Name) IOUNTED				
Management Service	s (\$ in M	lillions)		FY	2019	FY	2020	FY 2 Ba	2021 Ise	FY 2 O	2021 CO	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 Management Support - Contractor	C/CPFF	Various : Various	-	-		-		2.574	Jan 2021	-		2.574	0.000	2.574	Continuing
		Subtotal	-	-		-		2.574		-		2.574	0.000	2.574	N/A
Product Development (\$ in Millions)				FY	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO				
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
Mounted PNT Integration - Combat Platforms	C/CPFF	Various : Various	-	-		-		7.927	Dec 2020	-		7.927	0.000	7.927	Continuing
Mounted PNT Integration - Combat Support Platforms	C/CPFF	Various : Various	-	-		-		27.510	Mar 2021	-		27.510	0.000	27.510	Continuing
Mounted PNT Integration - Combat Systems Platforms	C/CPFF	Various : Various	-	-		-		11.190	Apr 2021	-		11.190	0.000	11.190	Continuing
Production Maturation	TBD	TBD : TBD	-	-		-		8.099	May 2021	-		8.099	0.000	8.099	Continuing
Client Software Development (JBCP)	TBD	TBD : TBD	-	-		-		1.295	Feb 2021	-		1.295	0.000	1.295	Continuing
Technical Manuals and Support Equipment	TBD	TBD : TBD	-	-		-		0.406	Dec 2020	-		0.406	0.000	0.406	Continuing
		Subtotal	-	-		-		56.427		-		56.427	0.000	56.427	N/A
Support (\$ in Millions	s)			FY	2019	FY	2020	FY 2021 Base		FY 2021 OCO		FY 2021 Total	Y 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 Technical Services - Government	Various	C5ISR : Various	-	-		-		1.038	Nov 2020	-		1.038	0.000	1.038	Continuing
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	-	-		-		2.513	Jan 2021	-		2.513	0.000	2.513	Continuing

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 Navigat	gram El 4120A <i>I A</i> ion and 7	ement (N Assured F Timing (Pl	l umber/N a Positioning NT)	ame) ^{I,}	Project EJ2 / M	(Number OUNTED	/Name)		
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
New Equipment Training (NET)	TBD	TBD : TBD	-	-		-		0.667	Apr 2021	-		0.667	0.000	0.667	Continuing
		Subtotal	-	-		-		4.218		-		4.218	0.000	4.218	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
Field Testing / Development Test	TBD	Various : TBD	-	-		-		5.514	Dec 2020	-		5.514	0.000	5.514	Continuing
		Subtotal	-	-		-		5.514		-		5.514	0.000	5.514	N/A
			Prior Years	FY	2019	FY 2	020	FY 2 Ba	2021 Ise	FY 2 Of	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		0.000		68.733		-		68.733	0.000	68.733	N/A

Remarks



xhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Feb	ruary 2020							
oppropriation/Budget Activity 040 / 4	R-1 Program I PE 0604120A <i>Navigation and</i>	Element (Numbe I Assured Positic I Timing (PNT)	Project (Number/Name) EJ2 / MOUNTED									
	Schedule Details	3										
	ſ	S	tart	E	nd							
Events		Quarter	Year	Quarter	Year							
Mounted A-PNT Prototyping and Testing - Phase I		1	2019	4	2019							
Mounted A-PNT Test and Integration - Phase II		4	2019	4	2020							
Client and Platform Integration		3	2019	4	2023							
Operational Tech Demonstration		4	2020	4	2020							
Direct Requirement Decision Preferred Material Solution		4	2020	4	2020							
MAPS Technology Insertion - AltNav		2	2020	3	2021							
Field Testing / Developmental Test		1	2021	4	2021							
Milestone C Low Rate Production Decision		2	2022	2	2022							
LRIP Contract Award		3	2022	3	2022							
Initial Operational Test & Evaluation		3	2022	4	2022							
Full Rate Production Decision		1	2024	1	2024							
FRP Contract Award		1	2024	1	2024							
MAPS Technology Insertion		2	2025	2	2025							
Exhibit R-2, RDT&E Budget Item	n Justificat	ion: PB 202	21 Army							Date: Febr	uary 2020	
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Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0604121A / Synthetic Training Environment Refinement & 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
Total Program Element	-	39.890	103.621	129.547	-	129.547	10.658	7.728	7.889	7.890	0.000	307.223
FD6: Synthetic Training Environment Refine & Prototype	-	39.890	29.176	122.553	-	122.553	10.658	7.728	7.889	7.890	0.000	225.784
SV1: Soldier/Squad Virtual Trainer	-	0.000	74.445	6.994	-	6.994	0.000	0.000	0.000	0.000	0.000	81.439

A. Mission Description and Budget Item Justification

The Synthetic Training Environment (STE) is the next generation holistic collective training capability that will enable leaders, Soldiers, and units to train where they will fight, along with their partners with whom they will fight, in complex operational environments to include dense urban, woodland, jungle, dessert, and sub-terrain, before they get there. The STE will operate within the entire range of combined arms maneuver tasks in support of Multi-Domain Operations. STE is currently a pre-acquisition effort leveraging Other Transactional Agreements (OTAs) on the path to Initial Operating Capability (IOC) in FY 2021. This collective training capability will revolutionize Army training by providing the repetitions and sets necessary to achieve improved proficiency prior to live training and combat; thereby improving Soldier lethality and survivability. The STE will be available where training occurs (home station, combat training centers, armories, institutions, ship-board, deployed).

STE is comprised of three main Lines of Effort: 1) STE-Information System; 2) Reconfigurable Virtual Collective Trainers (RVCT), both air and ground; and 3) Soldier / Squad Virtual Trainer (SSVT). STE-IS (delivers the Common Synthetic Environment, like an operating system), consisting of Global Terrain/One World Terrain (OWT), Training Simulation Software (TSS), and Training Management Tools (TMT). The RVCT Air and Ground (RVCT A/G) will collectively train units, using proponent developed Combined Arms Training Strategies (CATS), on a simulated, fully interactive, real-time battlefield. S/SVT is broken into Squad Immersive Virtual Trainer (SiVT) and Soldier Virtual Trainer (SVT). SiVT, which is the immersive training capability delivered as part of the Integrated Visual Augmentation System (IVAS) provides initial squad training capability for S/SVT in Increment 1. SVT will support Army wide formations such as artillery, Military Police, and units for Weapons Skills Development, Joint Fires Training and Use of Force. Future lines of effort under market research include the integration of Live training and Next Generation Constructive. The STE will be cloud-enabled, compatible with the Army Enterprise Network, and service-based through the Common Operating Environment, and will include the future Live and Constructive capabilities. The STE will provide the realistic repetitions necessary to fight 25 bloodless battles before the first battle; a Secretary of Defense priority.

FY 2021 base funding of \$129.547 million will finalize the technical development and demonstration of prototype designs to deliver IOC at 5 installations (Ft. Hood, JBLM, Ft. Leonard wood, Ft. Benning, and Ft. Drum) for STE-IS, RVCT, and SiVT (IVAS). Funds will also support conducting a Limited User Test (LUT) to verify and validate the capabilities of TSS, TMT, OWT and RVCT as an integrated prototype solution in the CSE. This effort will reduce technical risk, validate design, validate cost estimates and refine requirements for future STE, S/SVT and Live capabilities.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Arr	ny			Date:	February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4 Component Development & Prototypes (ACD&P)	: Advanced	R-1 Program El PE 0604121A / S	Prototyping		
B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	39.890	136.761	22.672	-	22.672
Current President's Budget	39.890	103.621	129.547	-	129.547
Total Adjustments	0.000	-33.140	106.875	-	106.875
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-33.140			
 Congressional Rescissions 	-	-			
Congressional Adds	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	106.875	-	106.875

Change Summary Explanation

FY 2020 decrease of \$33.140 million was due to congressional directed reductions for projects FD6 (\$12.500 million) and SV1 (\$20.640 million). FY2021 - \$58.000 million was realigned from STE Procurement funding (NA2020), and an additional \$49.000 million was added to better align with planned Other Transactional Authority (OTA) awarded in summer of FY 2019 (STE-IS and RVCT). This funding drives the development momentum leading up to the Limited User Test and IOC for STE in FY 2021.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060412 Environme	am Elemen 21A / Synthe nt Refineme	ment (Number/Name) Instruction Project (Number/Name) FD6 / Synthetic Training Environ & PrototypeProject (Number/Name) FD6 / Synthetic Training Environ & Prototype					
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
FD6: Synthetic Training Environment Refine & Prototype	-	39.890	29.176	122.553	-	122.553	10.658	7.728	7.889	7.890	0.000	225.784
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The STE will be a single, yet comprehensive interconnected training system that provides a Common Synthetic Environment (CSE), in which air and ground units from crew/section through Army Service Component Command (ASCC) conduct realistic multi-echelon / multi-domain combined arms maneuver, air ground integration, and mission command training. All of these components are interconnected and based off of a standard, modular and open system architecture model. The focus of the FD6 project is on the STE-IS and RVCT components of the holistic training strategy. The STE-IS provides a common software environment consisting of the Training Management Tool (TMT), Training Simulation Software (TSS), and One World Terrain (OWT) solution. The Training Management Tool (TMT) is the capability that enables units to quickly plan collective training events, prepare training events; execute and monitor events, and assess event results and readiness.

The Training Simulation Software (TSS), the core STE simulation engine, provides a realistic STE-IS that enables collective training from Soldier/Squad through ASCC. The STE-IS is a dynamic, digital representation of the Operational Environment (OE) and the military capabilities in the scenario. The TSS provides entity, aggregate, and common services, as well as adjudicates STE-IS interactions at the entity level (e.g., Computer-Generated Forces (CGF), and synthetic equipment).

The One World Terrain (OWT) is a 3-Dimensional global terrain capability and associated information services that supports the virtual replication of the physical Earth and complexities of the Operational Environment in support of training in the STE. The STE and RVCT requirements, which are codified in abbreviated Capabilities Development Documents (CDD-A) with full versions currently in staffing, directly support the Army Collective Training Environment - Initial Capabilities Document (ACTE-ICD) as the Army's cornerstone for replicating the Operational Environment (OE) during training events enabling the Army to train as it fights. Separate, but interoperable, RVCT systems are required for both air and ground collective training. The Air RVCT will represent the U.S. Army, Army National Guard, and Army Reserves fleet of rotary wing aircraft, and specified U.S. Marine Corps (USMC) aircraft. The Ground RVCT will represent ground/amphibious track and wheeled vehicles from the U.S. Army, Army National Guard, Special Operations Units and the USMC.

FY 2020 Update: STE User Assessment conducted in Apr-May 2019 further refined the requirement and demonstrated that the technology was quickly maturing and provided better costing data for STE. In June 2019, the contracting command awarded five subsequent STE OTAs for the STE-IS, RVCT, and S/SVT (Weapons Optimization) to seven vendors allowing better refinement of the technical requirements needed to achieve IOC in 4Q 2021. The focus of FY 2020 is on development and technical user assessments leading to a successful Limited User Test and Initial Operating Capability for the STE-IS and RVCT components in FY 2021.

FY 2021 base funding of \$122.553 million will finalize the technical development and demonstration of prototype designs to deliver IOC at 5 installations (Ft. Hood, Joint Base Lewis McCord, Ft. Leonard Wood, Ft. Benning, and Ft. Drum) for STE-IS and RVCT. In addition, funds support conducting a Limited User Test (LUT) to verify and validate the capabilities of STE-IS and RVCT as an integrated prototype solution with military utility. This effort will reduce technical risk, validate design, validate cost estimates and refine requirements for future STE, S/SVT and Live capabilities.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604121A / Synthetic Training Environment Refinement & Prototyping	Proje FD6 / & Pros	ct (Number/N Synthetic Tra totype	lame) ining Environ	ment Refine
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2019	FY 2020	FY 2021
Title: Program Management			6.811	0.200	-
Description: Program management, engineering and technical ove program.	ersight, contract support, and travel for the development of	of the			
FY 2020 Plans: Funds support the program management activities through the OTA Management support includes requirements decomposition, technic planning.	agreements in support of STE-IS and RVCT capability. cal assessments, user integration assessment and test				
FY 2020 to FY 2021 Increase/Decrease Statement: Phased support activities initiate transition into procurement for field	ling events and O&M for civilian management support.				
Title: Engineering, Support, Test & Evaluation			33.079	27.651	122.553
Description: Direct engineering development, support and test of the	he STE-IS and RVCT through awarded OTA vehicles.				
FY 2020 Plans: FY 2020 funding is critical to maintain technical advancements in th LUT and IOC in FY 2021. Funds support prototype development to Ground components of RVCT, Interim Contractor Support (ICS) sup capability, and the development and attribution of 3 dimensional (3E	e STE-IS and RVCT components in driving to a success for iterative Design Reviews of the SW baseline and Air/ oport through development, Cloud Services for network D) one world terrain.	ful			
FY 2021 Plans: FY 2021 base funding of \$122.553 million heavily focuses on finaliz IS and RVCT components reaching LUT and IOC in FY 2021. Fund technical capabilities through technical assessments and user asses development prototype activities on the training software baseline a data for the 5 IOC locations in 4Q 2021.	ing the development and prototype solutions of the STE- ls support the continued development and assessment o ssments, and test planning events. FY 2021 will finish ou nd reconfigurable units (Air and Ground) as well as 3D te	t the errain			
FY 2020 to FY 2021 Increase/Decrease Statement: FY 2021 funds ramp up the technical and user assessments as well support negotiated contract phasing of prototype, cloud, and terrain sites. FY 2021 also accounts for the integration of S&T technical ref RVCT capabilities prior to fielding IOC.	I as 3D terrain needed for IOC events in 4Q 2021. Funds services required for proving out the initial capabilities a finements into the SW baseline in support of the STE-IS	5 and			
Title: FY 2020 SBIR/STTR Transfer			-	1.325	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Da									Date: Fe	bruary 2020	
Appropriation/Budget ActivityR-1 Program Element (Number/Name)Project (Number/I2040 / 4PE 0604121A / Synthetic Training Environment Refinement & PrototypingFD6 / Synthetic Training & Prototype								(Number/Na Inthetic Train Inthetic Train	ame) ning Environi	ment Refine	
B. Accomplishments/Planned Pro	ograms (\$ in N	<u>/lillions)</u>							FY 2019	FY 2020	FY 2021
Description: Funding transferred in	n accordance v	with Title 15	USC ?638								
FY 2020 Plans: Funding transferred in accordance	with Title 15 U	SC ?638									
FY 2020 to FY 2021 Increase/Dec Funding transferred in accordance	rease Statem with Title 15 U	ent: SC ?638									
				Accon	nplishments	s/Planned P	rograms Su	btotals	39.890	29.176	122.553
C. Other Program Funding Summ	ary (\$ in Milli	<u>ons)</u>	FY 2021	FY 2021	FY 2021					Cost To	
Line Item • NA2000: Synthetic Training Environment (STE) Remarks	<u>FY 2019</u> -	<u>FY 2020</u> 14.449	<u>Base</u> 13.063	<u>000</u> -	<u>Total</u> 13.063	<u>FY 2022</u> 74.077	<u>FY 2023</u> 73.024	<u>FY 2024</u> 66.750	FY 2025 67.590	Complete Continuing	Total Cost Continuing

D. Acquisition Strategy

STE will be developed and acquired as an incrementally deployed software intensive program leveraging accelerated acquisition authorities when appropriate. To ensure speed and agility to deliver and modernize STE, a modular open systems architecture (MOSA) will be developed enabling the Army to exploit rapid advancements in cutting-edge commercial visualization and immersion technologies. STE will employ an IT Box requirements model to enable agile development of the STE-IS with parallel incremental development of the RVCT A/G and S/SVT. This model facilitates leveraging commercial and Government technology development that are necessary for future Live and Constructive centered increments. Other acquisition elements such as testing, contracting, and technology transition will consider any and all means available to innovate and incorporate complementary support to add momentum in this approach.

STE Increment 1 IOC is programmed for 4Q 2021. IOC is defined as the first fielding and acceptance of the STE-IS capability at installations identified IAW the Basis of Issue Plan (BOIP). IOC fielded STE systems will include the following attributes: verification, validation and accreditation process complete; STE-IS capabilities in support of RVCT A/G and Squad Immersive Virtual Trainer (SiVT) IOC in FY 2021 and ultimately the Soldier Virtual Trainer (SVT) IOC in FY 2023; meeting Information Assurance and Risk Management Framework requirements. New Equipment Training (NET) will include the capability to support the RVCT, and the ability to provide initial sustainment via interim contractor support (ICS). Soldiers will interface with the STE-IS through the Reconfigurable Virtual Collective Trainer (RVCT) and SiVT via the Integrated Visual Augmentation System (IVAS).

Future phases currently under market research will provide Soldier/Squad Virtual Trainer (S/SVT) capabilities and integrate Live training components as well as Next Generation Constructive (NGC).

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
204074	PE 0604121A I Synthetic Training Environment Refinement & Prototyping	PD67 Synthetic Training Environment Refine & Prototype

Five (5) OTAs were awarded in FY 2019 in support of STE prototype initiatives: STE-IS (TSS/TMT, OWT), RVCT, Live (market research only), and SVT Weapons Optimization (market research only). Confidence events and evaluations were built into the OTAs to determine the readiness and availability of technology in support of 4Q 2021 IOC. Prime(s) and Sub-vendors will execute the STE agreement(s) through an Agile development process with established success criteria and their DevOps processes. Vendors will continually include the Government and all stakeholders (Internal and external) in the Agile development process. This process will ensure all parties have transparency and early input into the modular design effort in order to support success of the product(s) being developed for the STE.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Army	y								Date:	February	2020		
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Enviror	ogram Ele 4121A / S ament Ref	ement (N Synthetic inement	l umber/N a Training & Prototyp	ame) Ding	Project (Number/Name) FD6 / Synthetic Training Environment Refin & Prototype					
Management Service	es (\$ in N	lillions)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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	
Management Services	Various	Various : Orlando, FL	5.577	6.811		0.200		-		-		-	Continuing	Continuing	Continuing	
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.325		-		-		-	0.000	1.325	-	
		Subtotal	5.577	6.811		1.525		-		-		-	Continuing	Continuing	N/A	
Product Developmer	nt (\$ in M	illions)		FY 2	2019	FY 2	2020	FY 2021 Base		FY 2 O(2021 CO	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 STE-IS/Common Synthetic Environment	C/FP	VT Mak : Cambridge, MA	23.432	11.496	Jun 2019	-		26.822	Dec 2020	-		26.822	Continuing	Continuing	Continuing	
Product Development STE-IS/One World Terrain	C/FP	Vricon : Mclean, VA	23.238	2.310	Jun 2019	3.390	Dec 2019	55.295	Dec 2020	-		55.295	Continuing	Continuing	Continuing	
Product Development Reconfigurable Virtual Collective Trainers	C/FP	Cole Engineering Services Inc : Orlando, FL	9.626	16.003	Jun 2019	24.261	Dec 2019	24.810	Dec 2020	-		24.810	Continuing	Continuing	Continuing	
Product Development Soldier/Squad Virtual Trainer (IVAS)	C/FP	Microsoft : Redmond, WA	34.792	-		-		13.626	Dec 2020	-		13.626	Continuing	Continuing	Continuing	
Small Business Innovation/ Tech Insertion	Various	Various : Orlando, FL	-	3.270		-		2.000	Dec 2020	-		2.000	Continuing	Continuing	Continuing	
		Subtotal	91.088	33.079		27.651		122.553		-		122.553	Continuing	Continuing	N/A	
			Prior Years	FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract	
		Project Cost Totals	96.665	39.890		29.176		122.553		-		122.553	Continuing	Continuing	N/A	

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021										Dat	te: F	ebru	lary	2020							
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (Number/Name)PE 0604121A / Synthetic TrainingFD6 / Synthetic Training Environment Refinement & PrototypingEnvironment Refinement & Prototyping& Prototype									men	t Ref	fine								
	-1																				
Event Name	FY 2019	FY 20	020	F	FY 20	21		FY 2	2022		F	Y 20	23		FY	202	4	I	FY 2	2025	
	1 2 3 4	1 2	3 4	1	2 3	4	1	2	3 4	l 1	2	3	4	1	2	3	4	1	2	3	4
A-CDD																					
CDD/AROC Approval																					
IOC						3															
FOC											4 FO	0									
Other Transaction Authority 1	OTA 1																				
OTA Tech Insertion																					
				Tech ins	sertion																
Production																					
						F	oduction	n													

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Feb	oruary 2020			
ppropriation/Budget Activity R 040 / 4 E	1 Program Element (Numb E 0604121A / Synthetic Train nvironment Refinement & Pro	er/Name) ing ototyping	Project (Number/Na FD6 / Synthetic Train & Prototype	Number/Name) hthetic Training Environment Refin			
Scheo	lule Details						
	S	start		End			
Events	Quarter	Year	Quarter	Year			
A-CDD	2	2019	2	2019			
CDD/AROC Approval	3	2020	3	2020			
IOC	4	2021	4	2021			
FOC	2	2023	2	2023			
Other Transaction Authority 1	2	2018	4	2021			
OTA Tech Insertion	1	2021	4	2025			
Production	4	2021	4	2025			

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020		
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060412 Environme	am Elemen 21A / Synthe nt Refineme	t (Number/letic Training ent & Protot	Name) yping	Project (N SV1 / Sold	(Number/Name) Idier/Squad Virtual Trainer			
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	
SV1: Soldier/Squad Virtual Trainer	-	0.000	74.445	6.994	-	6.994	0.000	0.000	0.000	0.000	0.000	81.439	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

The United States Army identified a near term requirement for a Soldier and Squad Virtual Trainer (S/SVT) to address the small unit collective training gaps, and to merge the Engagement Skills Trainer (EST) II, Call for Fire Trainer (CFFT) III, and the current non program of record Use-of-Force trainer into a single program starting in FY 2021. The S/SVT is the next generation trainer that enables Soldiers/Marines to conduct squad, weapons, and joint fires training, as well as rehearse lethal and non-lethal use-of-force interactions prior to live events to measure the unit's Mission Essential Task List proficiency, which then provide a unit's Objective 'T' readiness.

S/SVT is comprised of Squad Immersive Trainer (SiVT); also commonly referred to as both the IVAS and the Soldier Virtual Trainer (SVT) capabilities. The first increment of the SSVT, which is the Squad immersive Virtual Trainer (SiVT) capability, integrates into the Heads Up Display (HUD) 3.0 as part of the Integrated Visual Augmentation System (IVAS). Increments 2 and 3 of S/SVT combines individual Soldier and squad training into a single capability and includes STE Squad Capability (SSC), Weapon Skill Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF), which integrate the NEXTGEN Marksmanship and the NEXTGEN Call For Fire Artillery Virtual Training capability into the STE baseline.

The second phase; the SVT system design combines and integrates several individual Soldier and squad training capabilities, Weapon Skills Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF).

S/SVT is dependent and interconnected through the STE-IS software baseline. The STE-IS core cross-cutting capabilities deliver software, application(s) and services that optimize cloud-enabled capability simulation processing to Reconfigurable Virtual Collective Trainer (RVCT), Soldier Squad Virtual Trainer (S/SVT), and the future Next Generation Constructive (NGC) capability to include Force-on-Force (FoF) and Force-on-Target (FoT) Live training instrumentation.

FY 2021 funding of \$6.994 million reinitiates the market research and prototype solutions for the SVT solution assessing industry and academia's technical readiness and availability around Weapons Skills Development, Joint Fires and Use of Force.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Engineering, Support, Test & Evaluation	-	71.064	6.994
Description: Market Research and Prototype Assessment of Soldier Virtual Trainer capabilities.			
FY 2020 Plans: FY 2020 continues the prototype and development of the SiVT (IVAS) training components of the Soldier Lethality Heads Up Display (HUD) goggle and 3D immersive terrain as well the key integration of the holistic SW baseline enabling the overarching			

Exhibit R-2A, RDT&E Project Just	tification: PB	2021 Army							Date: Fe	bruary 2020	
Appropriation/Budget Activity 2040 / 4				R-1 Pi PE 06 <i>Enviro</i>	r ogram Eler 04121A / Sy nment Refin	nent (Numb Inthetic Train Dement & Pro	e r/Name) ing ototyping	Project (I SV1 / Sol	Number/Na dier/Squad	a me) Virtual Train	er
B. Accomplishments/Planned Pro	ograms (\$ in N	<u>/lillions)</u>						F	Y 2019	FY 2020	FY 2021
Soldier Virtual Trainer. Prototypes s assessments, and test planning for	support the eng the LUE test e	gineering an event and IO	d developme C in 4Q 202	ent of Capab 1.	ility sets 3 a	nd 4, technic	cal and user				
FY 2021 Plans: FY 2021 funding of \$6.994 million readines and academia?s technical readines will support a new OTA prototype at within industry helping to refine the	einitiates the n s and availabi ward to include overarching re	narket resea lity around V e technical a equirement f	rch and prot Veapons Sill assessments or the SVT s	otype solution Development and soldier solution.	ons for the S nt, Joint Fire user assess	VT solution a s and Use o ments of teo	assessing ind f Force. Res hnical availa	dustry ources ıbility			
FY 2020 to FY 2021 Increase/Dec Decrease in funding due to complet solutions with industry.	rease Statem tion of the initia	e nt: al SiVT (IVA)	S) prototype	capability ar	nd reengage	ment of the	further SVT				
Title: FY 2020 SBIR/STTR Transfe	r								-	3.381	-
Description: Funding transferred ir	n accordance v	with Title 15	USC ?638								
FY 2020 Plans: Funding transferred in accordance	with Title 15 U	SC ?638									
FY 2020 to FY 2021 Increase/Dec Funding transferred in accordance	rease Statem with Title 15 U	ent: SC ?638									
				Accon	nplishment	s/Planned P	rograms Su	btotals	-	74.445	6.994
C. Other Program Funding Summ	arv (\$ in Milli	ons)									
			<u>FY 2021</u>	<u>FY 2021</u>	<u>FY 2021</u>					<u>Cost To</u>	
Line Item	<u>FY 2019</u>	FY 2020	<u>Base</u>	000	Total	FY 2022	FY 2023	FY 2024	<u>FY 2025</u>	<u>Complete</u>	Total Cost
NA2000: Synthetic Training Environment (STE)	-	14.449	13.063	-	13.063	74.077	73.024	66.750	67.590	Continuing	Continuing
<u>Remarks</u>											
D. Acquisition Strategy The S/SVT uses the Synthetic Train delivery through the employment of	ning Environm f a combination	ent (STE) m	odular open	systems arc	chitecture via	a virtual inter	face and har	dware stand	lards. S/SV	T optimizes	training

delivery through the employment of a combination of Operational Environment (OE) mixed reality visualization and Natural User Interface (NUI) technologies to maximize efficiencies for the integration of system capabilities. The S/SVT system design combines and integrates several individual Soldier and squad training capabilities, Weapon Skill Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF), into a single capability that can be conducted simultaneously or

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0604121A I Synthetic Training	SV1 / Soldi	ier/Squad Virtual Trainer
	Environment Refinement & Prototyping		

individually and enable physical movement/exertion related to the execution of Soldier/Marine individual and squad collective training tasks. The system is required to be man transportable and deployable worldwide. It delivers training at the Point of Need (PoN) supporting Army-wide formations such as artillery, Military Police, and units for weapons skills development.

Two (2) OTAs awarded in FY 2019 in support of S/SVT prototype initiatives: SiVT (IVAS) Holistic Joint with Soldier Lethality, and SVT Weapons Optimization (market research only). Confidence events and evaluation criteria were built into the OTAs to determine technical availability and readiness in support of 4Q 2021 IOC. Prime(s) and Sub-vendors will execute the agreement(s) through an Agile development process with established success criteria and their DevOps processes. Vendors will continually include the Government and all stakeholders (Internal and external) in the Agile development process. This process will ensure all parties have transparency and early input into the design effort and success of the product(s) being developed for the STE.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	y								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (NuPE 0604121A / Synthetic TrainingSV1 / SoldieEnvironment Refinement & PrototypingSV1 / Soldie					(Number oldier/Squ	r/ Name) Jad Virtua	l Trainer		
Management Service	es (\$ in M	illions)		FY 2019		FY 2019 FY 2020		FY 2021 Base		FY	2021 CO	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	-	-		3.381		-		-		-	0.000	3.381	-
		Subtotal	-	-		3.381		-		-		-	0.000	3.381	N/A
Product Developme	Development (\$ in Millions)		2019	FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total					
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/FFP	Aberdeen Proving Grounds : MD	-	-		71.064		6.994	May 2021	-		6.994	0.000	78.058	-
		Subtotal	-	-		71.064		6.994		-		6.994	0.000	78.058	N/A
			Prior Years	FY	2019	FY 2	020	FY 2 Ba	2021 ase	FY O	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		/4.445		6.994		-		6.994	0.000	81.439	N/A

<u>Remarks</u>

Exhibit R-4, RDT&E Schedule Profile: PB :	Date: February	2020					
Appropriation/Budget Activity 2040 / 4		R P E	R-1 Program Elemen PE 0604121A I Synth Environment Refinem	Project (Number/Name) SV1 / Soldier/Squad Virtual Trainer			
Event Name	FY 2019	FY 2020	0 FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
	1 2 3 4	1 2 3	4 1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
IVAS/HUD 3.0 (Squad Immersive)							
SVT (Soldier Virtual)							
юс							
FOC							2

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Da	ate: February	2020		
ppropriation/Budget Activity 040 / 4	R-1 Program Element (Numbe PE 0604121A / Synthetic Trainin Environment Refinement & Prot	R-1 Program Element (Number/Name) PE 0604121A / Synthetic Training Environment Refinement & PrototypingProject (N SV1 / Sold Note					
	Schedule Details						
	St	art		End			
Events	Quarter	Year	Qua	rter	Year		
IVAS/HUD 3.0 (Squad Immersive)	2	2018	1	1	2021		
SVT (Soldier Virtual)	2	2019	4	4	2021		
IOC	4	2021	4	4	2021		
FOC	4	2025	4	4	2025		

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 I BA 4: Advanced PE 0604134A I Counter Improvised-Threat Demonstration, Prototype Deve Component Development & Prototypes (ACD&P) Testing						e Developr	nent, and					
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	13.831	-	13.831	14.650	15.480	16.330	17.200	0.000	77.491
CD4: Counter Improvised-Threat Demonstration	-	0.000	0.000	13.831	-	13.831	14.650	15.480	16.330	17.200	0.000	77.491

Note

This is a new start in FY2021.

This Program Element is a New Start for Fiscal Year 2021 (FY21).

A. Mission Description and Budget Item Justification

This Program Element (PE) develops prototypes and demonstrates technology for detecting and defeating Improvised Explosive Devices (IED). The goal of this Project is to mature technology to increase the ability of deployed forces to positively identify IEDs with minimal false alarms and increase the rate of advance of route clearance missions. Additionally the objective is to positively neutralize or mitigate the effects of IEDs with minimal collateral damage. Driven by the current threat facing deployed U.S. forces, this PE enables rapid development and delivery of capabilities that enable the detection, neutralization, and risk mitigation of IEDs and their effects. These technologies are intended to be matured and demonstrated for integration onto existing Department of Defense weapon systems.

This PE is coordinated with the Under Secretary of Defense for Research and Engineering (USD/R&E) including the Defense Threat Reduction Agency (DTRA).

Work in this PE was previously conducted under PE 0604134BR, Counter Improvised-Threat Technology Demonstration, Prototype Development, and Testing.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	13.831	-	13.831
Total Adjustments	0.000	0.000	13.831	-	13.831
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
Congressional Adds	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	13.831	-	13.831

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 I BA 4: Advanced	PE 0604134A I Counter Improvised-Threat Demonstration	on, Prototype Development, and
Component Development & Prototypes (ACD&P)	Testing	

Change Summary Explanation

This PE is realigned in FY21 from PE 0604134BR Counter Improvised-Threat Technology Demonstration, Prototype Development, and Testing as a result of the transfer of Counter-IED (C-IED) Research, Development, Test, and Evaluation (RDTE) activities to the Army and is fully coordinated with the Under Secretary of Defense for Research and Engineering (USD/R&E) and Defense Threat Reduction Agency (DTRA).

Exhibit R-2A, RDT&E Project Ju							Date: February 2020					
Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 060413 Demonstra and Testing	am Element (Number/Name)Project (Number/Name)34A I Counter Improvised-Threat ation, Prototype Development,CD4 I Counter Improvised-Threat Demonstrationg						
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
CD4: Counter Improvised-Threat Demonstration	-	0.000	0.000	13.831	-	13.831	14.650	15.480	16.330	17.200	0.000	77.491
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY2021.

This Program Element is a New Start for Fiscal Year 2021 (FY21).

A. Mission Description and Budget Item Justification

This Project develops prototypes and demonstrates technology for detecting and defeating Improvised Explosive Devices (IED). The goal of this Project is to mature technology to increase the ability of deployed forces to positively identify IEDs with minimal false alarms and increase the rate of advance of maneuver forces. Additionally the objective is to positively neutralize IEDs with minimal collateral damage. Driven by the current threat facing deployed U.S. forces, this PE enables rapid development and delivery of capabilities that enable the detection, neutralization, and mitigation of IEDs and their effects.

This Project is coordinated with the Under Secretary of Defense for Research and Engineering (USD/R&E) including the Defense Threat Reduction Agency (DTRA).

Work in this Project was previously conducted under PE 0604134BR, Counter Improvised-Threat Technology Demonstration, Prototype Development, and Testing.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Vehicle Borne IED Detection Technology Demonstration	-	-	1.975
Description: This effort conducts technology demonstration of sensing technologies to detect IEDs at entry control points for fixed bases. This effort uses nuclear quadropole resonance detection sensors matured in FY 2020 by the Defense Threat Reduction Agency to detect Vehicle Borne IEDs at vehicle check point with minimal false alarms.			
<i>FY 2021 Plans:</i> Will integrate nuclear quadropole resonance detection sensor into a vehicle check point. Will demonstrate the ability of the sensor to detect IEDs concealed in a vehicle.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		D	ate: Fel	bruary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604134A <i>I Counter Improvised-Threat</i> <i>Demonstration, Prototype Development,</i> <i>and Testing</i>	Project (Number/Name) CD4 / Counter Improvised-Threat Demonstration				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2	019	FY 2020	FY 2021	
This effort is a realignment from PE 0604134BR, Counter Improvised-Threat T and Testing, as a result of the transfer of C-IED RDT&E activities to the Army.	echnology Demonstration, Prototype Developr	nent,				
Title: Vehicle Borne IED Warnings and Indicators Technology Demonstration			-	-	1.341	
Description: This effort demonstrates fusion of existing sensing technologies of Vehicle Borne IEDs in areas surrounding fixed sites. This effort uses detect Threat Reduction Agency to predict the presence of Vehicle Borne IEDs using the vicinity of fixed sites.	to provide warnings and indicators for the pres ion techniques matured in FY 2020 by the Defe information collected by sensor systems locate	ence ense ed in				
FY 2021 Plans: Will conduct a demonstration of detection techniques applied to data collected Vehicle Borne IEDs.	by local sensor systems to identify indicators of	of				
FY 2020 to FY 2021 Increase/Decrease Statement: This effort is a realignment from PE 0604134BR, Counter Improvised-Threat T and Testing, as a result of the transfer of C-IED RDT&E activities to the Army.	echnology Demonstration, Prototype Developr	nent,				
Title: Radio Controlled IED Detection Technology Demonstration			-	-	2.595	
Description: This effort demonstrates Radio Controlled IED detection exploitin demonstrates the ability to detect Radio Controlled IEDs with minimal false ala	ng advanced network techniques. This effort rms.					
FY 2021 Plans: Will apply advanced network techniques to identify Radio Controlled IEDs at st of the detection techniques and document for urgent materiel release purposes	andoff distances. Will perform test and evalua s.	ition				
FY 2020 to FY 2021 Increase/Decrease Statement: This effort is a realignment from PE 0604134BR, Counter Improvised-Threat T and Testing, as a result of the transfer of C-IED RDT&E activities to the Army.	echnology Demonstration, Prototype Developr	nent,				
Title: Anti-Armor IED Detection Technology Demonstration			-	-	2.583	
Description: This effort demonstrates anti-armor IED detection using technolo infrared sensors to detect component characteristics to identify the location of	ogies to include high resolution electro-optical / IEDs prior to detonation.					
FY 2021 Plans:						

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020								
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604134A <i>I Counter Improvised-Threat</i> <i>Demonstration, Prototype Development,</i> <i>and Testing</i>	Projec CD4 / Demor	roject (Number/Name) D4 I Counter Improvised-Threat emonstration					
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2019	FY 2020	FY 2021			
Will conduct a demonstration of the use of advanced electro-optical / infra characteristics to identify the location potential IEDs. Will demonstrate th a standoff distance and quantify false alarm rates using a cluttered demo sensor technology and document for urgent material release purposes.	ared sensor processing techniques to detect comport the ability of these sensors to detect anti-armor IEDs a constration area. Will perform test and evaluation of the	nent at ne						
FY 2020 to FY 2021 Increase/Decrease Statement: This effort is a realignment from PE 0604134BR, Counter Improvised-The and Testing, as a result of the transfer of C-IED RDT&E activities to the A	reat Technology Demonstration, Prototype Developr Army.	nent,						
Title: Mitigation of Anti-Armor IED Technology Demonstration			-	-	0.550			
Description: This effort demonstrates mitigation of Anti-Armor IED effect Reduction Agency in FY 2020. This effort will demonstrate the use of ph of explosively formed penetrators and other explosively driven IED threat	ts using technologies developed by the Defense Thr ysical countermeasure technology to mitigate the eff ts.	eat ects						
FY 2021 Plans: Will demonstrate the Anti-Armor IED mitigation technology using surrogate on a surrogate armor plate.	te threat IEDs to evaluate the residual effects of the	IED						
FY 2020 to FY 2021 Increase/Decrease Statement: This effort is a realignment from PE 0604134BR, Counter Improvised-The and Testing, as a result of the transfer of C-IED RDT&E activities to the A	reat Technology Demonstration, Prototype Developr Army.	nent,						
Title: Booby Trap Structure IEDs Detection Technology Demonstration			-	-	2.537			
Description: This effort demonstrates detection techniques developed b 2020 using small unmanned aerial systems (UAS) with compact sensor t to develop high resolution imagery of structures with the ability to inspect effort demonstrates the ability to develop high fidelity mapping of multi-le	y the Defense Threat Reduction Agency (DTRA) in F echnologies including light detection and ranging (LI multi-level structures for the presence of IEDs. This vel structures to identify potential locations of IEDs.	=Y IDAR) s						
FY 2021 Plans: Will continue development of compact LIDAR sensor technologies for us detect concealed IEDs in an multi-level urban structure using a micro UA	e on small platforms. Will demonstrate the ability of S.	to						
FY 2020 to FY 2021 Increase/Decrease Statement:								

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020								
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604134A <i>I Counter Improvised-Threat</i> <i>Demonstration, Prototype Development,</i> <i>and Testing</i>	Projec CD4 / Demo	roject (Number/Name) D4 I Counter Improvised-Threat emonstration					
B. Accomplishments/Planned Programs (\$ in Millions)		[FY 2019	FY 2020	FY 2021			
This effort is a realignment from PE 0604134BR, Counter Improvised-Threat Te and Testing, as a result of the transfer of C-IED RDT&E activities to the Army.	echnology Demonstration, Prototype Developr	ment,						
Title: Personnel Borne IED Detection Technology Demonstration			-	-	2.250			
Description: This effort demonstrates Personnel Borne IED (PBIED) detection inexpensive sensor technologies including electro-optical and millimeter wave PBIEDs attached to personnel through thin walls. This effort demonstrates the with minimal false alarms.	a aggregating information from a network of sm radar subgarment imagers to sense the presen ability to aggregate sensor data to identify PB	nall, nce of BIEDs						
FY 2021 Plans: Will mature sensor fusion technologies to identify concealed PBIEDs in various environments. Will perform test and evaluation of the sensor technology and document for urgent material release purposes.								
FY 2020 to FY 2021 Increase/Decrease Statement: This effort is a realignment from PE 0604134BR, Counter Improvised-Threat Tr and Testing, as a result of the transfer of C-IED RDT&E activities to the Army.	echnology Demonstration, Prototype Developr	ment,						
	Accomplishments/Planned Programs Sub	totals	-	-	13.831			
 C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy The Army will coordinate plans with the Under Secretary of Defense for Resea Services to prototype and demonstrate CIED technologies, with Army and Ser use existing and new contracts to perform these efforts with selected industry demonstrations started in FY20 by DTRA based on review with DTRA, USD (F 	arch and Engineering (USD (R&E)), Defense T vice Laboratories and/or industry performing th partners based on solicitations issued. The Ar R&E) and other Services.	hreat R ne dem rmy will	Reduction Age onstration ac continue pro	ency (DTRA) tivities. The <i>i</i> mising techn	and other Army will ology			

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020		
Appropriation/Budge 2040 / 4	opropriation/Budget Activity 040 / 4						R-1 Program Element (Number/Name) PE 0604134A / Counter Improvised-Threat Demonstration, Prototype Development, and TestingProject (N CD4 / Counter Demonstration Demonstration						(Number/Name) ounter Improvised-Threat tration			
Product Developmen	t (\$ in M	illions)		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	
Vehicle Borne IED Detection Technology Demonstration	C/TBD	To Be Determined : To Be Determined	-	-		-		1.975	Dec 2020	-		1.975	0.000	1.975	-	
Vehicle Borne IED Warnings and Indicators Technology Demonstration	C/TBD	TBD : TBD	-	-		-		1.341		-		1.341	0.000	1.341	-	
Remote Controlled IED Detection Technology Demonstration	C/TBD	TBD : TBD	-	-		-		2.595	Dec 2020	-		2.595	0.000	2.595	-	
Anti-Armor IED Detection Technology Demonstration	C/TBD	TBD : TBD	-	-		-		2.583	Dec 2020	-		2.583	0.000	2.583	-	
Mitigation of Anti- Armor IED Technology Demonstration	C/TBD	TBD : TBD	-	-		-		0.550		-		0.550	0.000	0.550	-	
Booby Trap Structure IEDs Detection Technology Demonstration	Various	TBD : TBD	-	-		-		2.537		-		2.537	0.000	2.537	-	
Personnel Borne IED Detection Technology Demonstration	C/TBD	TBD : TBD	-	-		-		2.250		-		2.250	0.000	2.250	-	
		Subtotal	-	-		-		13.831		-		13.831	0.000	13.831	N/A	
Prior Years			FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
	Project Cost Totals							13.831		-		13.831	0.000	13.831	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	vrmy			Date: February 2020				
Appropriation/Budget Activity 2040 / 4		R-1 PE De and	1 Program Elemen 0604134A <i>I Coun</i> emonstration, Proto d Testing	nt (Number/Name) ter Improvised-Threat type Development,	Project (N CD4 / Cou Demonstra	lumber/Name) Inter Improvised-T ation	Threat	
Event Name	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	
	1 2 3 4	1 2 3 4	4 1 2 3 4	1 2 3 4 1	2 3 4	1 2 3 4	1 2 3 4	
Vehicle Borne IED Detection Technology Demonstration			Vehicle Borne IED Detec	tion Technology Demonstration				
VBIED Detection Integration			VBIED Detection Integra	tion				
VBIED Detection Demonstration			VBIED D	emonstration Event				
Vehicle Borne IED Warnings and Indicators Technology Demon	stration		Predictive Vehicle Borne	ED Detection Technology Demons	stration			
Radio Controlled IED Detection Technology Demonstration			Radio Controlled IED Der	tection Technology Demonstration				
Radio Controlled IED Detection Technique Maturation			Radio Controlled IED De	tection Technique Maturation				
Radio Controlled IED Detection Demonstration			Radio	Controlled IED Detection Demons	stration			
Anti-Armor IED Detection Technology Demonstration			Anti-Armor IED Detection	Technology Demonstration				
Anti-Armor IED Detection Technique Maturation			Anti-Armor IED Detection	Technique Maturation				
Anti-Armor IED Detection Demonstration			Anti-Arr	nor IED Detection Demonstration				
Mitigation of Anti-Armor IED Technology Demonstration			Anti-Armor IEC	D Mitigation Technology Demonstra	tion			
Booby Trap Structure IEDs Detection Technology Demonstration			Booby Trap Detectio	n Technology Demonstration				
Personnel Borne IED Detection Technology Demonstration			Personnel Borne IED De	tection Technology Demonstration				

PE 0604134A: Counter Improvised-Threat Demonstration,... Army

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: February 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604134A / Counter Improvised-Threat Demonstration, Prototype Development, and Testing	Project (N CD4 / Cou Demonstra	umber/Name) nter Improvised-Threat ition	

Schedule Details

	St	art	Er	nd
Events	Quarter	Year	Quarter	Year
Vehicle Borne IED Detection Technology Demonstration	1	2021	4	2021
VBIED Detection Integration	1	2021	3	2021
VBIED Detection Demonstration	4	2021	4	2021
Vehicle Borne IED Warnings and Indicators Technology Demonstration	1	2021	4	2021
Radio Controlled IED Detection Technology Demonstration	1	2021	4	2021
Radio Controlled IED Detection Technique Maturation	1	2021	4	2021
Radio Controlled IED Detection Demonstration	4	2021	4	2021
Anti-Armor IED Detection Technology Demonstration	1	2021	4	2021
Anti-Armor IED Detection Technique Maturation	1	2021	3	2021
Anti-Armor IED Detection Demonstration	3	2021	4	2021
Mitigation of Anti-Armor IED Technology Demonstration	2	2021	3	2021
Booby Trap Structure IEDs Detection Technology Demonstration	1	2021	4	2021
Personnel Borne IED Detection Technology Demonstration	1	2021	4	2021

Exhibit R-2, RDT&E Budget Item	n Justificat	tion: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0604182A / Hypersonics							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	404.000	801.417	-	801.417	526.501	755.294	592.452	576.243	0.000	3,655.907
HX1: Long-Range Hypersonic Weapon	801.417	-	801.417	526.501	755.294	592.452	576.243	243 0.000 3,655.90				

A. Mission Description and Budget Item Justification

The Program Element (PE) 0604182A Hypersonics funds the Rapid Capabilities and Critical Technologies Office (RCCTO) hypersonic effort.

Project HX1 Long-Range Hypersonic Weapon funds the RCCTO to field an experimental/prototype Hypersonic Weapon System with residual combat capability at the Battery Level as part of the Strategic Fires Battalion in support of Multi-domain Operations. The Long Range Hypersonic Weapon (LRHW) system will provide the Army a prototype strategic attack weapon system to defeat Anti Access/Area Denial (A2/AD) capabilities, suppress adversary Long Range Fires, and engage other high payoff/time critical targets. LRHW is common with other Department of Defense (DoD) hypersonic programs using the Common Hypersonic Glide Body, and the Navy 34.5 inch booster. Additionally the LRHW will include an existing Army Battle Fire Control system.

<u>ogram Change Summary (\$ in Millions)</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 202</u>	1 Total
Previous President's Budget	0.000	228.000	181.000	-	18	81.000
Current President's Budget	0.000	404.000	801.417	-	8	01.417
Total Adjustments	0.000	176.000	620.417	-	62	20.417
 Congressional General Reductions 	-	-				
 Congressional Directed Reductions 	-	-				
 Congressional Rescissions 	-	-				
 Congressional Adds 	-	176.000				
 Congressional Directed Transfers 	-	-				
 Reprogrammings 	-	-				
 SBIR/STTR Transfer 	-	-				
 Adjustments to Budget Years 	-	-	620.417	-	62	20.417
Congressional Add Details (\$ in Millions, and Inclue	des General Redu	<u>ictions)</u>		ſ	FY 2019	FY 2020
Project: HX1: Long-Range Hypersonic Weapon						
Congressional Add: Transfer from RDTE, DW line	124				-	31.000
Congressional Add: Program increase				_	-	130.000
Congressional Add, Drearen increase hypersoni	- and atratagic mad	aviale and atwist	uran contor of availlance	• T		15.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date Date					
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0604182A <i>I Hypersonics</i>					
Congressional Add Details (\$ in Millions, and Includes General Red	<u>uctions)</u>	FY 2019	FY 2020			
	Congressional Add Subtotals for Project: H		176.000			
	Congressional Add Totals for all Project	ets -	176.000			

Change Summary Explanation

The \$620.417 million increase is driven in support of the fielding of an experimental prototype with residual combat capability. The program plans on executing and accelerating the building and delivery of Long Range Hypersonic Weapon, Common Hypersonic Glide Body (CHGB) prototypes, and 34.5 inch Missile Body booster prototypes. Additionally, prototyping of Thermal Protection System (TPS) for the glide bodies will be stood up to expand the industrial base of TPS suppliers.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060418	am Elemen 32A / Hypers	t (Number / sonics	Name)	Project (N HX1 / Long	umber/Na n g-Range Hy	ne) personic We	eapon
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
HX1: Long-Range Hypersonic Weapon	-	0.000	404.000	801.417	-	801.417	526.501	755.294	592.452	576.243	0.000	3,655.907
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Program Element (PE) 0604182A Hypersonics funds the Rapid Capabilities and Critical Technologies Office (RCCTO) hypersonic effort.

Project HX1 Long-Range Hypersonic Weapon funds the RCCTO to field an experimental/prototype Hypersonic Weapon System with residual combat capability at the Battery Level as part of the Strategic Fires Battalion in support of Multi-domain Operations. The Long Range Hypersonic Weapon (LRHW) system will provide the Army a prototype strategic attack weapon system to defeat Anti Access/Area Denial (A2/AD) capabilities, suppress adversary Long Range Fires, and engage other high payoff/time critical targets. LRHW is common with other Department of Defense (DoD) hypersonic programs using the Common Hypersonic Glide Body, and the Navy 34.5 inch booster. Additionally the LRHW will include an existing Army Battle Fire Control system.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Long Range Hypersonic Weapon	-	217.646	801.417
Description: Funding is provided for planning, prototype manufacturing and testing of the Long Range Hypersonic Weapon.			
FY 2020 Plans: The Army Hypersonic Project Office worked with the Weapon System Integration Contractor to get through Systems Requirements Review and move towards a Preliminary Design Review for the system. Funding was used to order CHGBs and boosters for integration into All Up Rounds starting in Fiscal Year (FY) 2021.			
<i>FY 2021 Plans:</i> During FY 2021, LRHW will conduct a flight test (FT-3). During FY 2021, LRHW subsystems and components will continue fabrication with first articles. First articles will undergo testing and integration culminating in an initial prototype. Concurrent with LRHW prototype manufacturing, flight tests will occur to validate designs of the CHGB and booster stack. Flight test data collected will be used to anchor the system models and simulations. Prototyping of Thermal Protection System (TPS) for the glide bodies will be stood up to expand the industrial base of TPS suppliers.			
FY 2020 to FY 2021 Increase/Decrease Statement: The \$397.417 million increase is in support of the procurement of the long lead items (LLI) for the units produced in FY 2023. It includes support to conduct FT-3. It also includes flight test support, hardware and labor for JFC-1 and ASFT-1 to be conducted in FY 2022.			
Title: FY 2020 SBIR/STTR Transfer	-	10.354	-

	Date: February 2020				
er/Name)	Project (Number/Name) HX1 I Long-Range Hypersonic Weapor				
		FY 2019	FY 2020	FY 2021	
ograms Sub	ototals	-	228.000	801.417	
FY 2019	FY 20)20			
-	31.	.000			
-	130.	.000			
e -	15.	.000			
ls -	176.	.000			
r	er/Name) rograms Sub FY 2019e .e .e .als .	er/Name) Project HX1 / rograms Subtotals FY 2019 FY 20 FY 2019 FY 20 - 31. - 130. :e - 15. als - 176.	Date: er/Name) Project (Number/ HX1 / Long-Range FY 2019 FY 2019 rograms Subtotals - FY 2019 FY 2020 - 31.000 :e - 130.000 - :als -	Date: February 2020 er/Name) Project (Number/Name) HX1 / Long-Range Hypersonic I FY 2019 FY 2020 rograms Subtotals - FY 2019 FY 2020 FY 2019 FY 2020 - 31.000 :e - 130.000 130.000 :a - is -	

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

N/A

<u>Remarks</u>

D. Acquisition Strategy

The Army will field an experimental/prototype Hypersonic Weapons System with residual operational capability under an Urgent Materiel Release (UMR) like release NLT FY 2023 at the Battery Level as part of the Strategic Fires Battalion in support of Multi-domain Operations. CLS will be provided for one year. AHPO uses a combination of Other Transaction Authority's (OTA's) and the Navy CPS contract with Lockheed Martin.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	У								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name) PE 0604182A / Hypersonics					Project (Number/Name) HX1 / Long-Range Hypersonic Weapon				
Management Service	es (\$ in M	lillions)		FY	2019	FY 2	020	FY 2 Ba	:021 se	FY	2021 CO	FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Personnel and Operations Support	Various	TBD : .	-	-		24.823		30.000		-		30.000	0.000	54.823	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		10.354		-		-		-	0.000	10.354	-
		Subtotal	-	-		35.177		30.000		-		30.000	0.000	65.177	N/A
Product Developmer	nt (\$ in M	illions)		FY	2019	FY 2	020	FY 2 Ba	:021 se	FY	2021 CO	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
Contracts for technology development, and weapon design, integration, prototyping and testing	C/TBD	various : multiple	-	-		368.823		771.417		-		771.417	0.000	1,140.240	Continuing
		Subtotal	-	-		368.823		771.417		-		771.417	0.000	1,140.240	N/A
	_		Prior Years	FY	2019	FY 2	020	FY 2 Ba	021 se	FY . O	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		404.000		801.417		-		801.417	0.000	1,205.417	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021	Army					Date: February	2020
Appropriation/Budget Activity 2040 / 4		R-1 PE (Program Elemen 0604182A <i>I Hyper</i>	nt (Number/Name) rsonics	Project (N HX1 / Lon	lumber/Name) g-Range Hyperso	onic Weapon
	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Event Name	1 2 3 4	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 Build							
Systems Requirement Review		A					
Preliminary Design Review		4					
Critical Design Review			3				
Flight Testing							
Contractor Logistics Support (CLS)							
Transition to POR						4	

hibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Feb	ruary 2020	
propriation/Budget Activity 40 / 4	R-1 Program I PE 0604182A	Element (Number I Hypersonics	Project (Number/Name) HX1 / Long-Range Hypersonic Weapo			
	Schedule Details	5				
	ſ	Sta	irt	E	Ind	
Events		Quarter	Year	Quarter	Year	
Prototype Build		3	2019	4	2023	
Systems Requirement Review		1	2020	1	2020	
Preliminary Design Review		2	2020	2	2020	
Critical Design Review		1	2021	1	2021	
Flight Testing		3	2021	2	2023	
Contractor Logistics Support (CLS)		1	2024	4	2024	
Transition to POR		4	2024	4	2024	

Exhibit R-2, RDT&E Budget Item	1 Justificat	tion: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0604319A / Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	10.324	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.324
DU3: IFPC2	-	10.324	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.324
Program MDAP/MAIS Code: Pre	;					·						

A. Mission Description and Budget Item Justification

The Expanded Mission Area Missile (EMAM) program supports the Integrated Air and Missile Defense (IAMD) architecture and provides Indirect Fire Protection Capability Increment 2 (IFPC Inc 2) the kinetic intercept capability to defeat Cruise Missiles (CM), Unmanned Aircraft System (UAS), and Rocket, Artillery, and Mortar (RAM) threats.

The IFPC Inc 2 will provide a ground-based weapon system designed to acquire, track, engage, and defeat the CM, UAS, and RAM threats. The IFPC Inc 2 requirement consists of a launcher, integrated fire control, sensor, and an interceptor to support the Threshold CM and UAS defeat mission and Objective counter-RAM mission with alternative kinetic and non-kinetic defeat solutions.

EMAM is no longer acting as a separate program. EMAM will be incorporated into the IFPC Inc 2 program as a potential primary interceptor for the future Enduring IFPC Inc 2 system and provide kinetic intercept capability to defeat CM, UAS and RAM threats. EMAM is now known as the IFPC Inc 2 Interceptor with strategy and funding combined with the IFPC Inc 2 program beginning in Fiscal Year (FY) 2020. The IFPC Inc 2 systems will be integrated with the Army IAMD Command and Control (C2) architecture.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	40.979	0.000	0.000	-	0.000
Current President's Budget	10.324	0.000	0.000	-	0.000
Total Adjustments	-30.655	0.000	0.000	-	0.000
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
Congressional Adds	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-30.655	-			
SBIR/STTR Transfer	-	-			

Exhibit R-2A, RDT&E Project Ju		Date: February 2020										
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604319A I Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)Proje DU3 I					(Number/Name) =PC2						
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
DU3: IFPC2	-	10.324	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.324
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bud The Expanded Mission Area Miss Capability Increment 2 (IFPC Inc (RAM) threats.	Iget Item J i sile (EMAM 2) the kinet	ustification) program s tic intercept	upports the capability to	Integrated o defeat Cru	Air and Mis uise Missile	sile Defense s (CM), Unn	e (IAMD) and nanned Airc	chitecture a raft System	nd provides 1 (UAS), and	Indirect Fi d Rocket, A	re Protection rtillery, and N	1ortar

The IFPC Inc 2 will provide a ground-based weapon system designed to acquire, track, engage, and defeat the CM, UAS, and RAM threats. The IFPC Inc 2 requirement consists of a launcher, integrated fire control, sensor, and an interceptor to support the Threshold CM and UAS defeat mission and Objective counter-RAM mission with alternative kinetic and non-kinetic defeat solutions.

EMAM is no longer acting as a separate program. EMAM will be incorporated into the IFPC Inc 2 program as a potential primary interceptor for the future Enduring IFPC Inc 2 system and provide kinetic intercept capability to defeat CM, UAS and RAM threats. EMAM is now known as the IFPC Inc 2 Interceptor with strategy and funding combined with the IFPC Inc 2 program beginning in Fiscal Year (FY) 2020. The IFPC Inc 2 systems will be integrated with the Army Integrated Air and Missile Defense (AIAMD) Command and Control (C2) architecture.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: System Engineering & Program Management (SEPM)	3.065	-	-
Description: Funding is provided for systems engineering, integration, logistics engineering, system test and management efforts.			
Title: Engineering and Technical Support	1.265	-	-
Description: Funding is provided for engineering and technical support for the design of system hardware, software, and integration requirements.			
Title: System/Subsystem Development and Integration	5.631	-	-
Description: Funding is provided for hardware and software integration activities, technical assessments, concept studies, and integration and risk reduction.			
Title: System/Subsystem Developmental Testing	0.363	-	-

Exhibit R-2A, RDT&E Project Jus	stification: PB	2021 Army							Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Pr PE 060 <i>Capab</i>	ogram Elen 04319A / Inc bility Increme	n ent (Numb lirect Fire Pr nt 2-Intercep	t (Number/N FPC2	Number/Name) PC2						
B. Accomplishments/Planned Pr	ograms (\$ in N	<u>/lillions)</u>							FY 2019	FY 2020	FY 2021
Description: Funding is provided test activities.	for developmer	ital testing a	ctivities, moo	deling and si	mulation tes	t activities, a	nd cyber sec	curity			
				Accon	nplishments	/Planned P	rograms Su	btotals	10.324	-	-
C. Other Program Funding Sumr	<u>nary (\$ in Milli</u>	<u>ons)</u>									
Line Item • C62002: IFPC INC 2- I BLOCK 1 SYSTEM	<u>FY 2019</u> 31.286	FY 2020 9.337	<u>FY 2021</u> <u>Base</u> 106.261	<u>FY 2021</u> <u>OCO</u> -	<u>FY 2021</u> <u>Total</u> 106.261	<u>FY 2022</u> 237.803	FY 2023 392.134	<u>FY 202</u> 368.44	4 FY 202 7 274.56	Cost To 5 Complete 6 0.000	<u>Total Cost</u> 1,419.834
<u>Remarks</u>											

This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

D. Acquisition Strategy

The IFPC Inc 2 Product Office (PO) will verify technology readiness of missile alternatives in FY 2018 and will select one or more missiles to proceed in FY 2019. The PO will continue missile development, integration, and test to support Milestone B in 1 Quarter (Q) FY 2020. The program will conduct Engineering and Manufacturing Development through the end of FY 2022, Milestone C in 1Q FY 2023, and Initial Operational Test & Evaluation in FY 2023.

Formal selection is pending IAW with the senior Army leadership decision point for the Enduring IFPC Inc 2 program.

Appropriation/Budget Activity: Project (Number/Name) D3 / IPPC2 Project (Number/Name) D3 / IPPC2 Span="6">Contract Span="6">Span="6" Project (Number/Name) D3 / IPPC2 Span="6">Management Services (s in With's Location Project Minite Program Biomody International Colspan="6">Project Minite Program Management Project Minite Program Segment Project Minite Program Management Project Minite Proj	Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Management Services (s in Millions) FY 2019 FY 2020 FY 2021 FY 2021 FY 2017 FY 2017<	Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)ProjectPE 0604319A / Indirect Fire ProtectionDU3 / IFCapability Increment 2-Intercept (IFPC2)DU3 / IF						t (Number/Name) IFPC2			
Contract Cost Category HemContract & Type I Activity & Location Project Office : SystemPrior CostPrior 	Management Service	es (\$ in M	lillions)		FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Program Management Admin (PPC Base System)MuPProject Office : Project Office : Hurtsville, Alabama Magement Admin28,644	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 AdminVariousMultiple Activities : Rebana4.4.73.0.65Oct 2018 </td <td>Program Management Admin (IFPC Base System)</td> <td>MIPR</td> <td>Cruise Missile Defense Systems Project Office : Huntsville, Alabama</td> <td>28.644</td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td>0.000</td> <td>28.644</td> <td>-</td>	Program Management Admin (IFPC Base System)	MIPR	Cruise Missile Defense Systems Project Office : Huntsville, Alabama	28.644	-		-		-		-		-	0.000	28.644	-
Subtotal 33.115 3.065 - - - - 0.000 36.180 N/A Product Development (\$ in Millions) FY 2019 FY 2019 FY 2020 FY 2021 Base FY 2021 Cot FY 2021 Total FY 2021 Total FY 2021 Total System Engineering & System System) Contract Multipe Activities : Huntsville, AL Performing Activities : Huntsville, AL Award Date Cost Award Date Cost Award Date Cost FY 2021 Cot FY 2021 Total Cost Cost Target Value of Cost System Engineering & Integration (IFPC Base System) MIIPR Prior Various 54.463 . </td <td>Program Management Admin</td> <td>Various</td> <td>Multiple Activities : Redstone Arsenal, Alabama</td> <td>4.471</td> <td>3.065</td> <td>Oct 2018</td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td>0.000</td> <td>7.536</td> <td>-</td>	Program Management Admin	Various	Multiple Activities : Redstone Arsenal, Alabama	4.471	3.065	Oct 2018	-		-		-		-	0.000	7.536	-
Product Development Contract Method 			Subtotal	33.115	3.065		-		-		-		-	0.000	36.180	N/A
Image: Problem in the stand stan	Product Development (\$ in Millions)			FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total				
System Engineering & Integration (IFPC Base System) MIPR Cruise Missile Defense Systems, Project Office : Huntsville, AL 54.463 - Image and system for an antipart of the system system and system for an antipart of the system for antipart of the system and system function and the syst	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 & IntegrationVariousMultiple Activities : Huntsville, AL1.6003.210Oct 20180.0004.810-Engineering and Technical Support (IFPC Base System)MIPRMultiple Activities : Multiple Locations140.824-Image: Constraint of the constrai	System Engineering & Integration (IFPC Base System)	MIPR	Cruise Missile Defense Systems Project Office : Huntsville, AL	54.463	-		-		-		-		-	0.000	54.463	-
Engineering and Technical System/SubsystemMIPRMultiple Activities : Multiple Locations140.824	System Engineering & Integration	Various	Multiple Activities : Huntsville, AL	1.600	3.210	Oct 2018	-		-		-		-	0.000	4.810	-
Engineering and Technical SupportVariousMultiple Activities : Multiple Locations0.2001.265Oct 20180.0001.465-System/Subsystem Development and Integration (IFPC Base System/Subsystem Development and IntegrationMIPRMultiple Activities : AL191120.035-Image: Construction of the construction of th	Engineering and Technical Support (IFPC Base System)	MIPR	Multiple Activities : Multiple Locations	140.824	-		-		-		-		-	0.000	140.824	-
System/Subsystem Development and Integration (IFPC Base System)MIPRMultiple Activities : Multiple Locations120.035 <td>Engineering and Technical Support</td> <td>Various</td> <td>Multiple Activities : Multiple Locations</td> <td>0.200</td> <td>1.265</td> <td>Oct 2018</td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td>0.000</td> <td>1.465</td> <td>-</td>	Engineering and Technical Support	Various	Multiple Activities : Multiple Locations	0.200	1.265	Oct 2018	-		-		-		-	0.000	1.465	-
System/Subsystem Development and Integration C/CPFF TBD : Multiple Locations 4.191 2.421 Feb 2019 - Image: Column and Colu	System/Subsystem Development and Integration (IFPC Base System)	MIPR	Multiple Activities : Multiple Locations	120.035	-		-		-		-		-	0.000	120.035	-
Subtotal 321.313 6.896 - - - 0.000 328.209 N/A	System/Subsystem Development and Integration	C/CPFF	TBD : Multiple Locations	4.191	2.421	Feb 2019	-		-		-		-	0.000	6.612	-
			Subtotal	321.313	6.896		-		-		-		-	0.000	328.209	N/A

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Exhibit R-3, RDT&E	xhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army													Date: February 2020			
Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name) PE 0604319A / Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)Project (N DU3 / IFP					(Number PC2	r/Name)				
Test and Evaluation (\$ in Millions)				FY 2	2019	FY 2	:020	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/Subsystem Developmental Testing	MIPR	Multiple Activities : Multiple Locations	0.409	0.363	Oct 2018	-		-		-		-	0.000	0.772	-		
		Subtotal	0.409	0.363		-		-		-		-	0.000	0.772	N/A		
			Prior Years	FY 2	2019	FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
		Project Cost Totals	354.837	10.324		0.000		-		-		-	0.000	365.161	N/A		

Remarks
Exhibit R-4, RDT&E Schedule Profile: PB 20	021 Arm	y																D	ate:	Fe	bruar	ry 2	020			
Appropriation/Budget Activity 2040 / 4						R-1 PE Cap	Pro 0604 pabili	gran 319, ty In	n Ele A I In crem	emen ndireo nent 2	t (Nu ct Fir 2-Inte	umł re P erce	oer/N rotec pt (IF	ame tion PC2	;) <u>?</u>)	Pro DU:	j ect (3 / <i>IFI</i>	(Nur PC2	nbei	r/Na	ame)					
		EV 201	9		FY	2020		FY	202	91		FY	2023	,		FY 2	023		F	¥ 2	024	Т		= Y 2	025	
Event Name	1	2 3	4	1	2	3 4	1	2	3	4	1	2	3	4	1	2	3 4	1	2	2	3 4	4	1	2	3	4
EMAM Program Decision (Design Review 1)		ogram Decisior				·		•							·		·		t	•					i	
EMAM Integration & Testing	Inter	ration & Testir	na																							
IFPC Inc 2 Interceptor Pre-MS B Activities	Integ Pre-	MS B Activities	ng																							

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febru	ary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0604319A <i>Capability Incr</i>	Element (Number I Indirect Fire Prot rement 2-Intercept	r/Name) tection (IFPC2)	 Project (Number/Name) DU3 / IFPC2 			
	Schedule Details	S					
		Sta	art	En	d		
Events		Quarter	Year	Quarter	Year		
Expanded Mission Area Missile (EMAM) Decision Brief		1	2017	1	2017		
EMAM Program Decision (Design Review 1)		1	2019	1	2019		
EMAM Integration & Testing		4	2018	4	2019		
EMAM Materiel Development Decision (MDD)		4	2017	4	2017		
IFPC Inc 2 Interceptor Pre-MS B Activities		1	2018	4	2019		

Exhibit R-2, RDT&E Budget Iten	n Justificat	Stification: PB 2021 Army Date: February 2							uary 2020			
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	anced	R-1 Program Element (Number/Name) PE 0604403A / Future Interceptor										
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	2.000	7.992	-	7.992	7.993	7.993	7.993	7.993	Continuing	Continuing
FM3: Future Interceptor	-	0.000	2.000	7.992	-	7.992	7.993	7.993	7.993	7.993	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Lower Tier Future Interceptor program will provide improved operational effectiveness against evolving air, missile, and hypersonic threats within the lower tier portion of the ballistic missile defense battlespace. The future interceptor will increase Air and Missile (AMD) capability through increased velocity, altitude, and maneuverability.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	8.000	8.000	-	8.000
Current President's Budget	0.000	2.000	7.992	-	7.992
Total Adjustments	0.000	-6.000	-0.008	-	-0.008
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-6.000			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	-0.008	-	-0.008

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	Army							Date: Febr	ruary 2020	
Appropriation/Budget Activity 2040 / 4	am Elemen 03A / Future	t (Number/ Interceptor	Name)	Project (N FM3 / Futu	umber/Nar are Intercept	ne) tor						
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
FM3: Future Interceptor	-	0.000	2.000	7.992	-	7.992	7.993	7.993	7.993	7.993	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bud Lower Tier Future Interceptor pro lower tier portion of the ballistic m altitude, and maneuverability. Th overmatch evolving threat.	Iget Item J i ogram will p nissile defer ne acquisitic	ustification rovide impro nse battlesp on program	oved operat ace. The fu will competi	ional effect ture interce tively selec	iveness aga ptor will inc t a future in	ainst current rease Air an terceptor to	and evolvir nd Missile D complemer	ng air, missi efense (AM nt existing A	ile, and hyp 1D) capabilit Air and Miss	ersonic thre y through ir ile Defense	eats within th acreased ve (AMD) capa	ne locity, abilities to
B. Accomplishments/Planned P	Programs (S	in Millions	<u>s)</u>					FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Program Development and	Support							-	1.909	7.992	-	7.992
Description: Provide program de including technical work, concept	evelopment definition, r	and suppor nodeling & s	t for the Lov simulation v	ver Tier Fut vork, and o	ture Interce ther related	ptor progran efforts.	n,					
FY 2020 Plans: Fiscal Year (FY) 2020 Plans inclu -Worked on the Competitive conc -Initiated Modeling & Simulation c	ide: ept develop levelopmen	oments throu t for enhance	ugh Other T ced system	ransaction effectivene	Agreement ss assessm	s (OTA) nent						
FY 2021 Base Plans: -Continue execution of concept de -Continue Modeling & Simulation -Provide program support in the c -Initiate Prototyping activities for h	efinitions th developme levelopmen nigh risk tec	rough Othei nt for enhar t and execu hnology	Transaction nced system ntion of the A	ns Agreem effectiven Analysis of	ents (OTA) ess assessi Alternatives	ment s (AoA)						
FY 2020 to FY 2021 Increase/De FY 2021 funding increased and w initiate AoA, technology prototypin	ecrease Sta vill be used ng, and incr	a tement: to continue reased mana	FY 2020 ac agement su	tivities. Ado pport.	ditionally, fu	nding will be	e used to					
Title: FY 2020 SBIR/STTR Trans	fer							-	0.091	-	-	-
Description: Funding transferred	l in accorda	nce with Tit	le 15 USC î	?638								
FY 2020 Plans:												

		Date: February 2020			
Appropriation/Budget ActivityR-1 Program Element (Number/Name)Projection2040 / 4PE 0604403A / Future InterceptorFM3	ject (Number/Na 3 / Future Intercep	Number/Name) ture Interceptor			
B. Accomplishments/Planned Programs (\$ in Millions) FY 2019 FY	FY 2021 2020 Base	FY 2021 FY 202 OCO Total			
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 -	2.000 7.992	- 7.99			
C. Other Program Funding Summary (\$ in Millions)					
FY 2021 FY 2021 FY 2021 Line Item FY 2019 FY 2020 Base OCO Total FY 2022 FY 2023 FY 20	024 <u>FY 2025</u>	Cost To Complete Total Co			
• C53101: MSE Missile 1,131.276 /02.437 603.188 176.585 /79.773 765.887 1,008.835 908.7 Remarks	799 804.295	Continuing Continui			

D. Acquisition Strategy

To provide improved operational effectiveness, the Army will use the Defense Ordnance Technology Consortium (DOTC) OTA to execute a competitive initial concept definition (CD) with multiple contractors. From the CD phase, rapid prototype development approaches will utilize detailed modeling and simulation of the future interceptor as well as conduct prototype development of high-risk hardware technologies. The prototype technologies and detailed simulation based interceptor design will be used to competitively down select to a single vendor. This approach and the resulting technologies and designs will inform the selection of Acquisition Strategy (traditional or 804 Middle Tier) most advantageous for this project. This PB21 submission presents R-4 and R-4a schedule information in traditional acquisition terminology that will be updated with 804 Middle Tier terminology if utilized.

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budg 2040 / 4	et Activity	1				R-1 Program Element (Number/Name)Project (Number/Name)PE 0604403A / Future InterceptorFM3 / Future Interceptor									
Management Servic	es (\$ in M	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
PAC-3 Product Office	MIPR	Project Office : Huntsville, AL	-	-		-		0.350	Dec 2020	-		0.350	0.000	0.350	Continuing
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.091		-		-		-	0.000	0.091	-
Subtotal						0.091		0.350		-		0.350	0.000	0.441	N/A
Support (\$ in Million	is)			FY 2019		FY 2020		FY 2 Ba	2021 Ise	FY 2	2021 CO	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
SETA	Various	Multiple : Multiple	-	-		-		0.900	Feb 2021	-		0.900	0.000	0.900	Continuing
US Other Government Agencies (OGA)	MIPR	Various : Huntsville, AL	-	-		1.909	Jan 2020	6.742	Feb 2021	-		6.742	0.000	8.651	Continuing
Subtotal						1.909		7.642		-		7.642	0.000	9.551	N/A
Prior Years															
			Prior Years	FY	2019	FY	2020	FY 2 Ba	2021 Ise	FY 2 Of	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 202	1 Army							Date: February	2020	
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (Number/Name)PE 0604403A / Future InterceptorFM3 / Future Interceptor								
Event Name	FY 2019	FY 202	20	FY 2021	FY 2022	1	FY 2023	FY 2024	FY 2025	
Concept Development		Concept De	evelopmen	t						
Modeling & Simulation Development		Modeling &	Simulation	n Development						
Materiel Development Decision (MDD)				Materiel Development [Pecision (MDD)					
Analysis of Alternatives				Analysis of Alte	matives					
Lower Tier Future Interceptor CDD					Lower Tier Future Interce	otor CDD				
Competitive RFP						Compet	tive RFP			
Contract Award Downselect								2 Contract Award	Downselect	
Milestone A								3 Milestone A		
					1	I		1	<u> </u>	

hibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Feb	ruary 2020
propriation/Budget Activity 40 / 4	R-1 Program PE 0604403A	Element (Numbe I Future Intercept	r/Name) F or F	Project (Number/Nai M3 / Future Intercep	ne) tor
	Schedule Detail	S			
		St	art	E	nd
Events		Quarter	Year	Quarter	Year
Concept Development		2	2020	1	2024
Modeling & Simulation Development		2	2020	4	2023
Materiel Development Decision (MDD)		2	2021	2	2021
Analysis of Alternatives		2	2021	2	2022
Lower Tier Future Interceptor CDD		1	2022	1	2023
Competitive RFP		1	2023	4	2023
Contract Award Downselect		3	2024	3	2024
Milestone A		3	2024	3	2024

Exhibit R-2, RDT&E Budget Item	n Justificat	ion: PB 202	21 Army							Date: Febr	uary 2020		
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACE	ation, Army 0&P)	I BA 4: Adva	anced	R-1 Program Element (Number/Name) PE 0604541A / Unified Network Transport								
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost	
Total Program Element	-	0.000	29.700	40.677	-	40.677	40.924	41.204	41.219	41.422	Continuing	Continuing	
BT1: Interoperability	-	0.000	5.175	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.175	
BT2: Command Post Mobility/ Survivability	-	0.000	5.550	9.728	-	9.728	9.729	9.729	9.729	9.729	Continuing	Continuing	
BT3: Common Operating Environment (COE)	-	0.000	4.350	8.164	-	8.164	8.169	8.176	8.180	8.192	Continuing	Continuing	
BT4: Network Technology Maturation Initiatives (NTMI)	-	0.000	2.400	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.400	
BT5: Integrated Tactical Network/Enterprise Network	-	0.000	12.225	22.785	-	22.785	23.026	23.299	23.310	23.501	Continuing	Continuing	

Note

Funds supporting CFT Network efforts were previously requested in program Cross Functional Team (CFT) Advanced Development & Prototyping, OSD PE 0604020A.

A. Mission Description and Budget Item Justification

Unified Network Transport is directly aligned to the Army Network Modernization Strategy LOE 1 Unified Network; LOE 2, Common Operating Environment (COE), LOE 3, Interoperability; and LOE 4, Command Post Mobility and Survivability. These efforts support advanced component development activities that are aligned to the Army's Tactical Network Capability Set development and fielding plans.

The Network Cross-Functional Team (N-CFT) engages in technology demonstrations, focused evaluations, and expert analysis to inform future requirements, mature technologies, and deliver new capabilities. Subsequent to a decision for materiel development, the N-CFT develops and refines capability documentation aligned with the appropriate transition approach. The N-CFT will inform technology transitions, research and development, and user assessments, and then rapidly transition to appropriate Programs of Record.

FY 2021 funds will support identification, maturation, demonstration, and evaluation of Technology Readiness Level (TRL) 6+ systems and subsystem components including, but not limited to, resilient Line of Site (LOS) and beyond Line of Sight (BLOS) communications, information systems and information management; cyber electromagnetic activities (CEMA) situational understanding and operations; intelligence fusion, cloud technologies, virtual augmentation, artificial intelligence, and data convergence and analytics in the Common Operating Environment to inform the Integrated Tactical Network/Enterprise Network and Enabling Functions, Computing Environments, Interoperability and Command Posts. Successful solutions identified through evaluation in a high fidelity and realistic operating environment will be transitioned to Programs of Record for integration and fielding. Funds will also support integration with solutions identified in the other Modernization CFT efforts to ensure network dependencies are addressed.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army				Date:	February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: A Component Development & Prototypes (ACD&P)	Advanced	R-1 Program Ele PE 0604541A / L	ement (Number/Name) Jnified Network Transpor	t	
B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	39.600	41.400	-	41.400
Current President's Budget	0.000	29.700	40.677	-	40.677
Total Adjustments	0.000	-9.900	-0.723	-	-0.723
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-9.900			
 Congressional Rescissions 	-	-			
Congressional Adds	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	-0.723	-	-0.723

Change Summary Explanation N/A: FY20 New Start Program

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060454	am Elemen 1A / Unified	t (Number/ d Network T	Name) iransport	Project (N BT1 / Inter	umber/Nan operability	ne)	
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
BT1: Interoperability	-	0.000	5.175	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.175
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Interoperability is directly aligned to the Army Network Modernization Strategy LOE 1 and 2, Unified Network Transport and Common Operating Environment, respectively. These efforts support advanced component development activities that are aligned to the Army's Tactical Network Capability Set development and fielding plans.

The project enables Unified Action Partner Interoperability through integration into the Joint Information Environment (JIE) and the Mission Partner Environment (MPE). Interoperability is the ability to routinely act together coherently, effectively and efficiently to achieve tactical, operational, and strategic objectives. Interoperability between disparate forces allows coalitions to produce greater combat power than the sum of their parts by leveraging relative strengths while mitigating relative weaknesses.

Funding is used for technical maturation and evaluation of technologies to address gaps associated with LOE 3, Interoperability, solutions that will incorporate common commercial standards and/or widely recognized military interoperability standards. This funding will support demonstrations and experimentation, in a relevant operational environment, of key research and development (R&D) and science and technology (S&T) initiatives related to this effort, to include communications, information systems and information management; intelligence, surveillance and reconnaissance; intelligence fusion and digital fires.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: BT1: Interoperability	-	4.940	-
Description: This funding is used to identify and acquire technologies to address gaps associated with LOE 3, Interoperability, solutions for evaluation that will incorporate abilities to leverage common commercial standards and/ or widely recognized military interoperability standards. This funding will support demonstrations and evaluations, in a relevant operational environment, of key research and development (R&D) and science and technology (S&T) initiatives related to interoperability, to include communications, information systems and information management; intelligence, surveillance and reconnaissance; intelligence fusion and digital fires.			
FY 2020 Plans: FY 2020 funding initiates assessment of Unified Action Partners (UAPs) to determine levels of interoperability and integrate requirements by echelon, unit type and partner. Also, this funding initiates identifying multiple classification levels and access on Mission Partner Environment (MPE) solutions for evaluation. FY20 funding supports joint interoperability assessments during available user exercises such as, but not limited to: Joint Warfighter Assessment 20 and DEFENDER 20. Funding enables the Army to identify potential solutions for the following: enabling technologies to support the Army operating in an MPE; a deployed			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		[Date: Fo	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604541A / Unified Network Transport	Project (Nu BT1 / Interop	mber/N perabili	lame) ty	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2	2019	FY 2020	FY 2021
Army solution to extend episodic MPEs into the tactical network; and impleme (data, message and waveform Interoperability).	enting solutions to UAP information exchange ga	aps			
FY 2020 to FY 2021 Increase/Decrease Statement: Funding realigned to BT5 and BT3 to better align Interoperability objectives w Common Operating Environment efforts.	rithin Integrated Tactical/Enterprise Network and				
Title: FY 2020 SBIR/STTR Transfer			-	0.235	-
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 Sub	otals	-	5.175	-
		· ·			

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

N/A

<u>Remarks</u>

D. Acquisition Strategy

The Network CFT will coordinate on technologies to be evaluated with appropriate Program Management offices where there is an opportunity for technology insertion. Technologies that are determined to address technology gaps and require further evaluation will be documented in an acquisition decision memorandum after being approved by the Milestone Decision Authority. The various prototyping technologies will be pursued via competitively awarded contracts using best value source selection procedures.

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Pro PE 060	ogram Ele 4541A / L	ement (N Inified Ne	l umber/N etwork Tra	ame) ansport	Project BT1 / In	teroperat	r/ Name) pility		
Management Service	s (\$ in M	illions)		FY 2019		FY 2020		FY 2021 Base		FY 2	2021 CO	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 Management Office Support	TBD	TBD : TBD	-	-		0.441	Mar 2020	-		-		-	0.000	0.441	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.235		-		-		-	0.000	0.235	-
		Subtotal	-	-		0.676		-		-		-	0.000	0.676	N/A
Product Developmen	nt (\$ in Mi	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
TEM (Technical Exchange Meeting) Prototyping and Evaluations	TBD	TBD : TBD	-	-		3.117	Jul 2020	-		-		-	0.000	3.117	-
		Subtotal	-	-		3.117		-		-		-	0.000	3.117	N/A
Support (\$ in Millions	5)			FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Interoperability Engineering and Technical Support	TBD	CCDC C5ISR : APG, MD	-	-		0.691	Mar 2020	-		-		-	0.000	0.691	-
		Subtotal	-	-		0.691		-		-		-	0.000	0.691	N/A
Test and Evaluation ((\$ in Milli	ons)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Interoperability Test and Evaluation	TBD	CCDC : C5ISR, PEO C3T : APG, MD	-	-		0.691	Mar 2020	-		-		-	0.000	0.691	-
		Subtotal	-	-		0.691		-		-		-	0.000	0.691	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	021 Army	/								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4				R-1 Pro PE 0604	gram E l 4541A /	lement (N Unified Ne	u mber/Na twork Trar	n me) nsport	Project BT1 / Ini	(Number teroperab	/ Name) ility		
	Prior Years	FY 2	2019	FY 2	020	FY 2 Bas	021 Se	FY 2 OC	021 O	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		5.175		-		-		-	0.000	5.175	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy									Date:	February	2020	
Appropriation/Budget Activity 2040 / 4			R-1 Pr PE 060	ogram Ele 04541A / L	emen Inified	t (Num d Netwo	ber/Nam ork Transp	e) port	Project (I BT1 / Inte	Number roperab	/ Name) ility		
Event Name	FY 2019	FY 20	020	FY 202	21	F١	(2022		FY 2023	F	2024	FY	2025
	1 2 3 4	1 2 3	3 4	1 2 3	4	1 2	3 4	1	2 3 4	1 2	3 4	1 2	3 4
TEM (Technical Exchange Meeting) Protoyping and Evaluations		Capability	Gap Reduc	tion and Enhand	cement	Developme	nt Effort						
Interoperability Evaluation #1		Joir	nt Warfighte	er Assessment									
Interoperability Evaluation #2		EU	COM Exerci	se									
				015150									

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Da	ate: February	2020		
ppropriation/Budget Activity 040 / 4	R-1 Program Element (Nu PE 0604541A / Unified Net	mber/Name) work Transport	Project (Num BT1 / Interope	Number/Name) eroperability		
	Schedule Details					
		Start		End		
Events	Quarter	Start Year	Qua	End rter	Year	
Events TEM (Technical Exchange Meeting) Protoyping and Evaluations	Quarter 2	Start Year 2020	Quar 4	End rter	Year 2020	
Events TEM (Technical Exchange Meeting) Protoyping and Evaluations Interoperability Evaluation #1	Quarter 2 3	Start Year 2020 2020	Quai 4	End rter 4 3	Year 2020 2020	

<u>Note</u>

TEM projects are continuous activities; N-CFT will reach out to industry partners in order to assess and demonstrate the latest emerging technologies which will reduce capability gaps and provide rapid software/hardware insertions into Programs of Record.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy						1	Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060454	am Elemen 1A / Unified	t (Number / d Network T	Name) Transport	Project (N BT2 / Com	umber/Nan mand Post	1e) Mobility/Sur	vivability
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
BT2: Command Post Mobility/ Survivability	-	0.000	5.550	9.728	-	9.728	9.729	9.729	9.729	9.729	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Command Post Mobility/Survivability is directly aligned to the Army Network Modernization Strategy LOE4, Command Post Mobility and Survivability. These efforts support advanced component development activities that are directly aligned to the Army's Tactical Network Capability Set development and fielding plans.

This project supports mobile Command Post efforts and is directly aligned with the Command Post Integrated Infrastructure (CPI2). The technical maturation and evaluation allow for Command Post disaggregation capabilities to inform future designs. Spectrum obfuscation and assessments of antenna remoting will support the Command Post efforts for CPI2 Increment 2 and beyond.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: BT2 Command Post Mobility and Survivability	-	5.298	9.728
Description: This funding is used to identify and acquire technologies for evaluation that address gaps associated with LOE 4, Command Post (CP), in the overall Integrated Tactical Network. The CP LOE will focus on developing and obtaining approval of requirements for integrated command posts, then delivering these integrated command post designs to Army units. LOE 4 addresses the operational requirement of Deployable, Integrated, and Mobile Command Post and integrates Knowledge Management.			
<i>FY 2020 Plans:</i> FY 2020 funding initiates survivable command post solutions that enable dispersed Command Post (CP) footprint, reduced CP Electromagnetic vulnerability, and extensible CP decoys for deception. Also, subsequent funding will support evaluations that identify potential solutions for the following: Expeditionary tactical servers, integrated roll-on/roll-off kits, automated management and monitoring software to provision and manage command post; enhanced hardware operating at multiple classification levels pending availability of cross domain solution; technology enhancements addressing gaps discovered through the delivery of CP Directed Requirement capabilities, and the development and delivery of Integrated CP Designs that provide agility, mobility, and protection. Technologies with successful results will be transitioned into an existing Program of Record strategy for integration and fielding.			
FY 2021 Plans: Funds will be used to mature, prototype, and evaluate emerging technologies that will inform design choices for the Command Post Integrated Infrastructure (CPI2) Increment 2 and beyond. Effort includes evaluation for tactically employable Command Post (CP) disaggregation capabilities, will also allow for the integration of spectrum obfuscation modes of employment for limited			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020				
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604541A <i>I Unified Network Transport</i>	(Number/Name)Project (Number/Name)Network TransportBT2 / Command Post Mobility/Survivabi						
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2019	FY 2020	FY 2021			
radio frequency emissions capabilities into a tactically deployable CP and asse integration of Mission Partner Environment hardware components into the CP. with FORSCOM and inform the program technical baseline and DOTMLPF. Wi with Industry that will assess, demonstrate, prototype, and integrate emerging i capabilities. Efforts will inform the requirements for a survivable and effective m environment.	ss antenna remoting solutions, and will enabl These efforts will be demonstrated and evalu Il conduct iterative Technical Exchange Meeti ndustry solutions to mature Command Post nobile Command Post in a contested and cons	e uated ings gested						
FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to partial realignment of funding from BT1 to align Interoperability and provide additional evaluations of the capability set roadmap.	within Command Post Mobility/Survivability e	efforts						
Title: FY 2020 SBIR/STTR Transfer			-	0.252	-			
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 Sub	ototals	-	5.550	9.728			
 <u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> The Network CFT will coordinate on technologies to be evaluated with appropri Technologies that are determined to address technology gaps and require furth approved by the Milestone Decision Authority. The various evaluations and privalue source selection procedures. 	iate Program Management offices where ther her evaluation will be documented in an acqu ototyping of technologies will be pursued via o	re is an isition d competi	opportunity fo lecision mem itively awarde	or technology orandum after ed contracts u	insertion. r being sing best			

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	У								Date:	February	2020													
Appropriation/Budge 2040 / 4	et Activity	/			R-1 Program Element (Number/Name)Project (Number/Name)PE 0604541A / Unified Network TransportBT2 / Command Post Mobility										vability												
Management Service	es (\$ in M	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY	2021 CO	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 Management Office Support	TBD	TBD : TBD	-	-		0.437	Oct 2020	-		-		-	0.000	0.437	-												
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.252		-		-		-	0.000	0.252	-												
		Subtotal	-	-		0.689		-		-		-	0.000	0.689	N/A												
Product Developmer	nt (\$ in M	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2021 OCO		FY 2021 OCO		FY 2021 OCO		FY 2021 OCO		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												
TEM (Technical Exchange Meeting) Prototyping and Evaluations	TBD	TBD : TBD	-	-		3.637	Jul 2020	-		-		-	0.000	3.637	-												
Commercially-driven Prototyping and Evaluation	TBD	TBD : TBD	-	-		-		4.428	Feb 2021	-		4.428	0.000	4.428	-												
Government-driven Prototyping and Evaluation	TBD	CCDC C5ISR; PEO C3T : APG, MD	-	-		-		5.300	Dec 2020	-		5.300	0.000	5.300	-												
		Subtotal	-	-		3.637		9.728		-		9.728	0.000	13.365	N/A												
Support (\$ in Million	s)			FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY	2021 CO	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												
CP Engineering/Technical Support	TBD	TBD : TBD	-	-		0.687	Jul 2020	-		-		-	0.000	0.687	-												
		Subtotal	-	-		0.687		-		-		-	0.000	0.687	N/A												
Test and Evaluation	(\$ in Milli	ions)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2021 OCO		FY 2021 OCO		FY 2021 OCO		FY 2021 OCO		FY 2021 OCO		FY 2021 OCO		FY 2021 OCO		FY 2021 Total]		
Cost Category Item CP Test and Evaluation	Contract Method & Type TBD	Performing Activity & Location TBD : TBD	Prior Years -	Cost	Award Date	Cost 0.537	Award Date Jul 2020	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete 0.000	Total Cost 0.537	Target Value of Contract												

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Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budget ActivityR-1 Program Element (Number/Name)Project (2040 / 4PE 0604541A / Unified Network TransportBT2 / Co								(Numbei ommand	r/ Name) Post Mobi	lity/Survi	vability				
Test and Evaluation	(\$ in Milli	ons)		FY 2	2019	FY 2	:020	FY 2 Ba	2021 ase	FY 2	2021 CO	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	-	-		0.537		-		-		-	0.000	0.537	N/A
	Prior Years	FY	2019	FY 2	020	FY 2 Ba	2021 ase	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
		Project Cost Totals	-	-		5.550		9.728		-		9.728	0.000	15.278	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy						Date: February	2020
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060454	I m Elemer 1A I Unifie	nt (Number/Name d Network Transp	e) Proj port BT2	j ect (N 2 / Com	umber/Name) mand Post Mobi	lity/Survivability
								1

Event Name	F	Y 201	9		FY:	2020			FY	2021		F	Y 20	22		FY	202	3		FY	2024	1		FY 2	025	i -
Literitane	1	2 3	4	1	2	3	4	1	2	3 4	4	1	2 3	4	1	2	3	4	1	2	3	4	1	2	3	4
Node to Node Connectivity Solutions																										
TEM (Technical Exchange Meeting) Prototyping and Evaluations																										
Survivable Command Post																										
Warfighting Assessments - MPE/Network Operations																										
															1				1							

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				D	ate: Febru	uary 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program E PE 0604541A /	lement (Numbe Unified Network	r/Name) Transport	Project (Nun BT2 / Comma	nber/Nam and Post N	e) Mobility/Survivability
S	Schedule Details					
		St	art		En	d
Events		Quarter	Year	Qua	arter	Year
Node to Node Connectivity Solutions		3	2020		4	2022
TEM (Technical Exchange Meeting) Prototyping and Evaluations		2	2020		4	2025
Survivable Command Post		2	2021		4	2022
Warfighting Assessments - MPE/Network Operations		1	2021		4	2021

Note

TEM projects are continuous activities; N-CFT will reach out to industry partners in order to assess and demonstrate the latest emerging technologies which will reduce capability gaps and provide rapid software/hardware insertions into Programs of Records.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progr a PE 060454	am Elemen 41A <i>I Unified</i>	t (Number/ d Network T	Project (N BT3 / Com (COE)	umber/Nan mon Opera	1e) ting Environ	nment	
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	Total Cost	
BT3: Common Operating Environment (COE)	-	0.000	4.350	8.164	-	8.164	8.169	8.176	8.180	8.192	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Common Operating Environment (COE) is directly aligned to the Army Network Modernization Strategy LOE 2, Common Operating Environment (COE). These efforts support advanced component development activities that are aligned to the Army's Tactical Network Capability Set development and fielding plans.

This project will inform future network, applications and data capability sets by evaluating and maturing the use of cloud technologies, virtual augmentation, artificial intelligence, data convergence and analytics in the Common Operating Environment. This includes processing and storage to improve the architecture support for mobile, secure and distributed operations. Common Operating Environment (COE), creates an approved set of standards, computing technologies, integrated data and databases, common graphics and a unified set of mission command applications. It allows warfighters to adapt and configure the network as conditions change which is outlined in the approved COE requirements documents.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: BT3 Common Operating Environment	-	4.153	8.164
Description: This funding is used to identify and acquire technologies to address gaps associated with LOE 2, Common Operating Environment (COE), in the overall Integrated Network. This LOE creates an approved set of standards, computing technologies, integrated data and databases and common graphics and a unified set of mission command applications. It will also support collaboration using a common picture with joint and coalition mission partners. This LOE delivers an integrated body of requirements that meet operational needs. The decisive action within this LOE is informing the next version of COE in FY 2021.			
FY 2020 Plans: FY 2020 funding supports assessment and evaluation of potential solutions for the following: distributed computing, using cloud technologies in a tactical space, machine learning, a modular & dockable computing infrastructure, and cyber hardening through Tactical Endpoint Security. Technologies with successful results will be transitioned to a rapid acquisition initiative or into an existing Program of Record strategy.			
FY 2021 Plans: Will support evaluation of mature technologies that capture, correlate, and present data from available sources such as spectrum, electronic warfare (EW), red and gray space for visualization for cyber situational understanding. Will assess and evaluate the technical feasibility of solutions for expanded computing in tactical environments, data convergence, sensor integration across identified platforms, and flexible and scalable computing hardware/software. Will enable commanders to visualize, understand,			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604541A / Unified Network Transport	Projec BT3 / (<i>(COE)</i>	ct (Number/Name) Common Operating Environment		
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2019	FY 2020	FY 2021
describe, and assess complex problems rapidly. Will conduct iterative Technic solutions to assess, demonstrate, prototype, and integrate emerging industry s capabilities.	al Exchange Meetings to find Industry potentia olutions to mature Common Operating Enviror	al nment			
FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to partial realignment of funding from BT1 to align Interoperability	within Common Operating Environment effort	s.			
Title: FY 2020 SBIR/STTR Transfer			-	0.197	-
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 Sub	totals	-	4.350	8.164
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy The Network CFT will coordinate on technologies to be evaluated with appropriate	riate Program Management offices where there	e is an c	opportunity fo	or technology	insertion.
Technologies that are determined to address technology gaps and require furt approved by the Milestone Decision Authority. The prototyping technologies in selection procedures.	her evaluation will be documented in an acquis in this project will be pursued via competitively a	sition de awardeo	ecision memo d contracts u	orandum after Ising best valu	⁻ being ue source

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060	ogram Ele 4541A / L	ement (N Inified Ne	lumber/Na etwork Tra	ame) Insport	Project BT3 / C (COE)	: (Numbe i Common C	·/Name))perating E	Environm	ent
Management Service	es (\$ in M	lillions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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 Management Office Support	TBD	TBD : TBD	-	-		0.451	Mar 2020	-		-		-	0.000	0.451	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.197		-		-		-	0.000	0.197	-
		Subtotal	-	-		0.648		-		-		-	0.000	0.648	N/A
Product Developmen	nt (\$ in M	illions)		FY	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
TEM (Technical Exchange Meeting) Prototyping and Evaluations	TBD	TBD : TBD	-	-		2.700	Jul 2020	-		-		-	0.000	2.700	-
Commercially-driven Prototyping and Evaluation	TBD	TBD : TBD	-	-		-		7.164	Feb 2021	-		7.164	0.000	7.164	-
Government-driven Prototyping and Evaluation	TBD	CCDC C5ISR, PEO C3T : APG, MD	-	-		-		1.000	Dec 2020	-		1.000	0.000	1.000	-
		Subtotal	-	-		2.700		8.164		-		8.164	0.000	10.864	N/A
Support (\$ in Millions	s)			FY	2019	FY :	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
COE Engineering/ Technical Support	TBD	TBD : TBD	-	-		0.451	Mar 2020	-		-		-	0.000	0.451	-
		Subtotal	-	-		0.451		-		-		-	0.000	0.451	N/A
	Notwork	Transport													
PE 0004541A: Unified	INETWORK	iransport			U	ICLA3	עםו־ווכע								649

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 0604	9 gram Ele 4541A / U	ement (N Inified Ne	umber/N etwork Tra	ame) Insport	Project BT3 / C (COE)	(Number ommon C	r/ Name) Operating E	Environm	ent
Test and Evaluation (\$ in Millions) FY 201						FY 2019 FY 2020 Base OCO					2021 CO	FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Cost Date Cost		Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
COE Test and Evaluation	TBD	TBD : TBD	-	-		0.551	Sep 2020	-		-		-	0.000	0.551	-
		Subtotal	-	-		0.551		-		-		-	0.000	0.551	N/A
Prior Years FY 2015					2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals						4.350 8.164 -						8.164	0.000	12.514	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	vrmy						Date: February	2020			
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name)Project (Number/Name)PE 0604541A I Unified Network TransportBT3 I Common Operating Environment (COE)								
	FY 2019	FY 20	20	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025			
Event Name	1 2 3 4	1 2 3	3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4			
TEM (Technical Exchange Meeting) Prototyping and Evaluations	\$										
Cyber Situational Understanding											

hibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febru	ary 2020
propriation/Budget Activity 10 / 4	R-1 Program Element (Number PE 0604541A <i>I Unified Network</i>	r/ Name) Transport	Project (Nu BT3 / Comm (COE)	mber/Name non Operati	e) ng Environment
S	chedule Details				
	Sta	art		En	d
Events	Sta Quarter	art Year	Qı	En	d Year
Events TEM (Technical Exchange Meeting) Prototyping and Evaluations	Quarter 2	art Year 2020	Q	En uarter 2	d Year 2025

Note

TEM projects are continuous activities; N-CFT will reach out to industry partners in order to assess and demonstrate the latest emerging technologies which will reduce capability gaps and provide rapid software/hardware insertions into Programs of Record.

Exhibit R-2A, RDT&E Project J	ustification	: PB 2021 A	Army							Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4			Project (N BT4 / Netw Initiatives (umber/Nar /ork Techno /NTMI)	ne) blogy Matul	ration						
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
BT4: Network Technology Maturation Initiatives (NTMI)	-	0.000	2.400	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.400
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bud This project is directly aligned to This project funding will mature sorganizations. The lab-based an coordination of transport, networ This includes evaluation and pro shooter cycles and Joint Multi-Du	dget Item J the Army N solutions thr d operationa k and data d totyping of r omain Com	ustification etwork Mod ough evalua al field evalu classificatior nature algor mand and C	ernization S ation from n lation and a n, visualizat rithms/syste control.	Strategy Lin on-Army or issessment ion for Situa ems to supp	nes of Effort ganizations is will suppo ational Und port Joint an	and Capabi that include ort the Army erstanding, id Coalition	ility Set 23 c e the Servic 's use of teo CEMA, and data sharing	objectives a es, Academ chnologies t artificial int g for Missio	nd beyond. nia and othe support Ja relligence fo n Command	r science a bint collabo r Capability d/Intel conv	nd technolo ration and Set 23 and ergence, so	bgy d beyond. ensor to
Title: BT4: Network Technology	Maturation I	nitiatives (N	- <u>,</u> ITMI)							-	2.291	-
<i>Description:</i> This funding will be to enhance operational capability engineering and programmatic su <i>FY 2020 Plans:</i> This funding provides support rec	e used to con / through ou upport requi	ntinuously ic r Market Re red for exec	dentify, prior search and cution of lab	ritize, matur Concept C -based and	re, demonst Capability De I field protot	trate, and in evelopment typing and e	sert emergin activities. F valuation.	ng technolo unding prov	ogies vides			
record. FY 2020 funding support in from mature Network Transport i	ts lab-based nitiatives fro	and field ev m Industry,	valuation of the Service	Governme s, and/or th	ent and Corr ne Office of	mercial solution for the secreta	utions and s ry of Defens	olutions de se.	rived			
FY 2020 to FY 2021 Increase/Decrease Statement: Funding realigned to BT5 to reflect alignment with Integrated Tactical / Enterprise Network.												
Title: FY 2020 SBIR/STTR Trans	sfer									-	0.109	-
Description: Funding transferred	d in accorda	nce with Tit	le 15 USC '	?638								
FY 2020 Plans:												

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020)		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604541A / Unified Network Transport	Proje BT4 / Initiati	roject (Number/Name) T4 / Network Technology Maturation itiatives (NTMI)				
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2019	FY 2020	FY 2021		
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 Sub	btotals	-	2.400	-		
N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> The various evaluations and prototyping of technologies will be pure	sued via competitively awarded contracts using best valu	ue sourc	e selection p	procedures.			

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 20	021 Arm	ıy								Date:	February	2020		
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060	ogram Ele 4541A / L	ement (N Inified Ne	lumber/N etwork Tra	ame) ansport	Project (Number/Name) ort BT4 I Network Technology Maturation Initiatives (NTMI)					
Management Service	es (\$ in M	illions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY O	2021 CO	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 Management Office Support	TBD	TBD : TBD	-	-		0.214	Mar 2020	-		-		-	0.000	0.214	-	
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.109		-		-		-	0.000	0.109	-	
		Subtotal	-	-		0.323		-		-		-	0.000	0.323	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	
NTMI Engineering/ Technical Support	TBD	TBD : TBD	-	-		1.713	Apr 2020	-		-		-	0.000	1.713	-	
		Subtotal	-	-		1.713		-		-		-	0.000	1.713	N/A	
Test and Evaluation	(\$ in Milli	ions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY O	2021 CO	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	
NTMI Test and Evaluation	TBD	TBD : TBD	-	-		0.364	Jun 2020	-		-		-	0.000	0.364	-	
		Subtotal	-	-		0.364		-		-		-	0.000	0.364	N/A	
Prior Years		FY 2019		FY 2020		FY 2021 Base		FY O	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract			
		Project Cost Totals	-	-		2.400		-		-		-	0.000	2.400	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 /	Date: February 2020								
Appropriation/Budget Activity 2040 / 4			R-1 Program Elemer PE 0604541A / Unifie	nt (Number/Name ed Network Transp	e) Project ort BT4 / No Initiative	Project (Number/Name) BT4 I Network Technology Maturation Initiatives (NTMI)			
Event Name	FY 2019	FY 202	0 FY 2021	FY 2022	FY 2023	FY 2024	FY 2025		
Commercial Network Transport Evaluation	1 Z 3 4	1 2 3	4 1 Z 3 4	1 2 3 4	1 2 3 1	4 1 2 3 4	1 Z 3 4		
Government Network Transport Evaluation		D	T						

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: February 2020			
Appropriation/Budget ActivityR-1 Program2040 / 4PE 0604541/	Element (Numbe	r/Name) Pr Transport B1 Ini	Project (Number/Name) BT4 / Network Technology Maturation Initiatives (NTMI)				
Schedule Deta	ils						
	St	art	E	nd			
Events	Quarter	Year	Quarter	Year			
Commercial Network Transport Evaluation	3	2020	4	2020			
Government Network Transport Evaluation	3	2020	4	2020			

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	vrmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0604541A <i>I Unified Network Transport</i>				Project (Number/Name) BT5 / Integrated Tactical Network/Enterp Network				
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
BT5: Integrated Tactical Network/Enterprise Network	-	0.000	12.225	22.785	-	22.785	23.026	23.299	23.310	23.501	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Integrated Tactical Network/Enterprise Network is directly aligned to the Army Network Modernization Strategy LOE 1 Unified Network. These efforts support advanced component development activities that are aligned to the Army's Tactical Network Capability Set development and fielding plans.

This funding will inform design decisions for future tactical network capability sets in the areas of Aerial Tier, LEO, MEO, GEO high throughput satellite capabilities, cyber hardened communications, and resilient Line of Site (LOS) and beyond Line of Sight (BLOS) waveforms through evaluation and technical maturation. It will increase bandwidth and range; improve mobility and network security; harden the network and support interoperability with Joint and Unified Action Partners.

This project enables a converged Mission Command Network that operates seamlessly worldwide and in any environment. It includes the development of a standardsbased network architecture that unifies enterprise and deployed network capabilities and features a unified transport layer, network operations and other enabling functions that allows integration of disparate networks. The Army network will provide resiliency through path diversity and dynamic routing to ensure tactical units can communicate in hostile environments. It will provide multiple ways to communicate and give commanders the ability to choose their communications methods and tools during operations. It fully incorporates cyber and electronic warfare capabilities that support the employment of the network as a weapon system. The ITN/IEN enables Unified Action Partner Interoperability through integration into the Joint Information Environment (JIE) and the Mission Partner Environment (MPE). Interoperability is the ability to routinely act together coherently, effectively and efficiently to achieve tactical, operational, and strategic objectives. Interoperability between disparate forces allows coalitions to produce greater combat power than the sum of their parts by leveraging relative strengths while mitigating relative weaknesses.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Project BT5: Integrated Tactical Network/Integrated Enterprise Network	-	11.670	22.785
<i>Description:</i> This funding is used to identify and acquire technologies to address gaps associated with LOE 1, Unified Network, for evaluation and demonstration in the overall Integrated Network. The Unified Network LOE enables a converged Mission Command Network that operates seamlessly worldwide and in any environment. This will require the creation of a standards-based network architecture that effectively integrates enterprise and deployed network capabilities across domains and environments, and features a unified transport layer that permits "plug and play" for specific network capabilities. LOE 1 addresses the following operational requirements: Converged Mission Command Network, Network Augmentation / Extension, and Synthetic Training Environment.			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: Fe					
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604541A <i>I Unified Network Transport</i>	Project (Number/Name) BT5 / Integrated Tactical Network/Enterprise Network			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021	
FY 2020 funding supports identifying solutions for network fail-over in a contest Alternate Contingency & Emergency) and demonstrate rapid restoration capatic communications network which supports BLOS communications between Diview with high altitude balloon satellite surrogates. Restoring the NCW network provide Also, this funding supports demonstration and acquisition plans for evaluation Next Generation Tactical radio, Air to ground integration, Secure LTE capabilit Network Operations (NetOps), Cyber Electromagnetic Activities (CEMA) and Technology enhancements will provide Integrated Multi-Transport Capabilities Line Of Sight Communications Range Extension, Electronic Protection of Tact NetOps Tools, Distributed Computing Tools, and High Capacity Transport for I successful results will be transitioned to a rapid acquisition initiative or an exist fielding.	sted environment to enable PACE (Primary, bility for a denied WGS NCW tactical ision, Brigade, Battalion and Company echelo vides resiliency to communications, including I of potential solutions for the following: Acceler ies for mounted/ dismounted soldiers, and Tac factical Identity and Access Management (IdA , High Capacity Line of Sight Backhaul Radios ical Communications, Network Gateways,Tac Heavy Mobile Platforms. Technologies with ting Program of Record strategy for integration	ns .RPF. ate ctical M). ; ical			
<i>FY 2021 Plans:</i> Will prototype and evaluate Army science and technology solutions in order to and critical network modernization efforts to accelerate Next Generation Tactic capabilities for mounted/ dismounted soldiers and solutions for a hardened, re and other advanced solutions for communications network processing, transpo- a contested and congested environment. This includes evaluating and prototyp communications for tactical and strategic Army assets in satellite denied, area to enemy detection and interception. Funding will allow the Army to identify ar transport and gateway components of the Mission Partner Environment (MPE) warfighting assessments and evaluations that will inform Capability Set 23 and Meetings with Industry and non-Army organizations such as other Services, D assess, demonstrate, prototype, and integrate emerging industry solutions to r integration of government and commercial Low Earth Orbit (LEO), Mid Earth O (GEO) high throughput satellite communications. Will reduce capability gaps a for Programs of Record. These efforts directly support the Army's tactical netwo Congress.	support approved requirements documents cal radios, Air to ground integration, Secure LT silient network. Will evaluate artificial intelligen ort, and operations to support resiliency in ping with emerging technology solutions for denied environments and increase immunity ad prototype solutions to mature the network and share network operations information thr d beyond. Will conduct iterative Technical Exc ARPA, NSA, OSD, FFRDs, and Academia to mature unified network capabilities to include Drbit (MEO) and Geosynchronous Earth Orbit and provide rapid software/hardware insertions work acquisition strategy roadmap submitted to	E ce ough hange			
FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to realignment of funding from BT4 and partial realignment of BT Integrated Tactical Network / Enterprise Network and support higher Integrated	1 to better align Interoperability objectives with d Tactical Network / Enterprise Network priorit	nin ies.			
Title: FY 2020 SBIR/STTR Transfer		-	0.555	-	

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604541A <i>I Unified Network Transport</i>	Proje BT5 / Netwo	Project (Number/Name) BT5 / Integrated Tactical Network/Enterpris Network			
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2019	FY 2020	FY 2021	
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 Sul	ototals	-	12.225	22.785	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>						
D. Acquisition Strategy The Network CFT will coordinate on technologies to be evaluated with appro Technologies that are determined to address technology gaps and require fu approved by the Milestone Decision Authority. The various prototyping progr	priate Program Management offices where the rther evaluation will be documented in an acqu rams in this project will be pursued via competi	re is an isition d tively av	opportunity for ecision mem varded contra	or technology orandum afte acts using bes	insertion. r being st value	

source selection procedures.
Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	у	Date: February 2020										
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060	ogram Ele 4541A / L	ement (N Jnified Ne	lumber/Na etwork Tra	ame) Insport	Project BT5 / Ir Networ	tegrated k	·/ Name) Tactical Ne	etwork/Ei	nterprise
Management Service	es (\$ in M	illions)		FY	2019	FY 2020		FY 2 Ba	2021 ase	FY 2	2021 CO	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 Management Office Support	TBD	TBD : TBD	-	-		0.861	Mar 2020	-		-		-	0.000	0.861	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.555		-		-		-	0.000	0.555	-
		Subtotal	-	-		1.416		-		-		-	0.000	1.416	N/A
Product Developmen	duct Development (\$ in Millions)					FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
TEM (Technical Exchange Meeting) Prototyping and Evaluations	TBD	TBD : TBD	-	-		7.087	Jul 2020	-		-		-	0.000	7.087	-
Commercially-driven Prototyping and Evaluation	TBD	TBD : TBD	-	-		-		9.485	Feb 2021	-		9.485	0.000	9.485	-
Government-driven Prototyping and Evaluation	TBD	CCDC C5ISR; PEO C3T : APG, MD	-	-		-		13.300	Dec 2020	-		13.300	0.000	13.300	-
		Subtotal	-	-		7.087		22.785		-		22.785	0.000	29.872	N/A
Support (\$ in Millions	s)			FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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
TEM Engineering Technical Support	TBD	TBD : TBD	-	-		1.861	Jun 2020	-		-		-	0.000	1.861	-
		Subtotal	-	-		1.861		-		-		-	0.000	1.861	N/A
PE 0604541A: Unified	Network	Transport			UN	ICLASS	SIFIED								661

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2						Date:	February	2020					
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (NPE 0604541A / Unified Network TransportBT5 / IntegramNetworkNetwork					(Number tegrated	r/ Name) Tactical N	etwork/E	nterprise	
Test and Evaluation (\$ in Millions)					2019	FY 2	020	FY 2 Ba	2021 ase	FY : O	2021 CO	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	TBD	TBD : TBD	-	-		1.861		-		-		-	0.000	1.861	-
		Subtotal	-	-		1.861		-		-		-	0.000	1.861	N/A
Prior Years		Prior Years	FY	2019	FY 2021 FY 2020 Base		FY : O	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract			
Project Cost Totals						12.225		22.785		-		22.785	0.000	35.010	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy						Date: February	2020	
Appropriation/Budget Activity 2040 / 4			R-1 P PE 06	rogram Elemer 604541A / Unifie	Number/Name) egrated Tactical Network/Enterprise				
Event Name	FY 2019	FY 20	20	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	
Tactical Resiliency for Comms, LEO/MEO/GEO	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3	4
Spectrum Obfuscation									
TEM (Technical Exchange Meeting) Prototyping and Evaluations									
Application Security with Containers (AppSec-C)				•					
Protected Comms for MUM-T									
Next Generation High Frequency (NGHF)									
Non-traditional Waveforms									
WGS Ka Band Surrogate									
Narrowband SATCOM									
Protected SATCOM									
Information Trust									
Autonomous Cyber									

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date: Febru	ary 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program I PE 0604541A	Element (Numbe Unified Network	r/Name) Transport	Project (Number/Nam BT5 / Integrated Tactica Network	e) al Network/Enterpris
	Schedule Details	5			
	ſ	Sta	art	En	d
Events		Quarter	Year	Quarter	Year
Tactical Resiliency for Comms, LEO/MEO/GEO		2	2020	4	2021
Spectrum Obfuscation		2	2020	2	2023
TEM (Technical Exchange Meeting) Prototyping and Evaluation	ns	2	2020	4	2025
Application Security with Containers (AppSec-C)		2	2020	1	2021
Protected Comms for MUM-T		2	2021	1	2023
Next Generation High Frequency (NGHF)		2	2021	1	2024
Non-traditional Waveforms		2	2021	1	2026
WGS Ka Band Surrogate		2	2022	3	2022
Narrowband SATCOM		2	2022	1	2024
Protected SATCOM		4	2021	3	2023
Information Trust		1	2023	4	2025
Autonomous Cyber		1	2023	4	2025

<u>Note</u>

TEM projects are continuous activities; N-CFT will reach out to industry partners in order to assess and demonstrate the latest emerging technologies which will reduce capability gaps and provide rapid software/hardware insertions into Programs of Record.

Exhibit R-2, RDT&E Budget Item	n Justificat	i on: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	st & Evalua types (ACE	R-1 Program Element (Number/Name) R Evaluation, Army I BA 4: Advanced PE 0604644A I Mobile Medium Range Missile PE 0604644A I Mobile Medium Range Missile										
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	5.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.000
MR1: <i>Mobile Intermediate Range</i> <i>Missile</i>	-	0.000	5.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.000

Note

Fiscal Year (FY) 2021 funding change is a result of Army realignment of funds to higher priority programs.

A. Mission Description and Budget Item Justification

Mobile Medium Range Missile provides the Joint Force Commander a lower cost strategic capability that can attack specific threat vulnerabilities in order to penetrate, dis-integrate, and exploit in the strategic and deep maneuver areas. It mitigates Extremely High Risk (EHR) capability gap. There is no FY 2021 funding request.

B. Program Change Summary (\$ in Millions)	FY 2019	<u>FY 2020</u>	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	20.000	90.000	-	90.000
Current President's Budget	0.000	5.000	0.000	-	0.000
Total Adjustments	0.000	-15.000	-90.000	-	-90.000
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-15.000			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
 Adjustments to Budget Years 	-	-	-90.000	-	-90.000

Change Summary Explanation

FY 2020 and FY 2021 funding change is a result of Army realignment of funds to higher priority programs.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	Army							Date: Feb	oruary 2020		
Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 060464 <i>Missile</i>	r am Elemen 44A / <i>Mobile</i>	t (Number / e Medium R	Name) ange	Project (I MR1 / <i>Mc</i>	Sumber/Na bile Interme	Name) mediate Range Missile		
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	
MR1: <i>Mobile Intermediate Range</i> <i>Missile</i>	-	0.000	5.000	0.000	-	0.000	0.000	0.000	0.00	0.00	0.000	5.000	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
Fiscal Year (FY) 2021 funding cha A. Mission Description and Bud Mobile Medium Range Missile pro- dis-integrate, and exploit in the st	ange is a ro get Item J ovides the rategic and	esult of Arm ustification Joint Force I deep mane	y realignme Commande euver areas	ent of funds er a lower co . It mitigate	to higher p ost strategic s Extremely	riority progra c capability t / High Risk (ams. hat can atta (EHR) capa	ick specific bility gap. T	threat vuln here is no	erabilities ir FY 2021 fu	n order to pe nding.	netrate,	
B. Accomplishments/Planned P	rograms (\$ in Million	<u>s)</u>						F	Y 2019	FY 2020	FY 2021	
<i>Title:</i> TM/RR										-	4.773	-	
Description: Develop the Army's field artillery units with an extende	next gener d range ca	ration mediu pability sup	m range sti porting stra	rike missile tegic forces	capability. a in full, limit	Mobile Medi ted or exped	um Range l litionary ope	Missile proverations.	vides				
FY 2020 Plans: Supported acquisition strategy dev component maturation assessmer	velopment, nt, and con	, system req tract strateg	uirements/s	specificatior nent.	n definition/	developmen	it, transition	ed technolc	ogy/				
FY 2020 to FY 2021 Increase/De FY 2021 funding change is a resu	crease Sta It of Army i	atement: realignment	of funds to	higher prio	rity program	าร.							
Title: FY 2020 SBIR/STTR Transf	fer									-	0.227	-	
Description: Funding transferred	in accorda	ince with Tit	le 15 USC '	?638									
FY 2020 Plans: Funding transferred in accordance	e with Title	15 USC ?6:	38										
FY 2020 to FY 2021 Increase/De Funding transferred in accordance	crease Sta e with Title	atement: 15 USC ?63	38										
					Accompli	shments/Pl	anned Prog	grams Sub	totals	-	5.000	-	
									,,	I	L. L.		

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604644A <i>I Mobile Medium Range</i> <i>Missile</i>	Project (Number/Name) MR1 / Mobile Intermediate Range Missile
C. Other Program Funding Summary (\$ in Millions)	!	
N/A		
<u>Remarks</u>		
D. Acquisition Strategy Leverage non-traditional contracting strategy to transition/develop specific threat vulnerabilities in order to penetrate, dis-integrate, a	/mature current and near-term support efforts to provide nd exploit in the strategic and deep maneuver areas.	Joint Force Commanders capabilities to attac

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budg 2040 / 4	et Activity	1		R-1 Program Element (Number/Name) PE 0604644A / Mobile Medium Range MissileProject (Number/Name) MR1 / Mobile Intermediate Ra							Range N	lissile			
Management Servic	es (\$ in M	illions)		FY	2019	FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total]		
Cost Category Item	Contract Method Performing Cost Category Item & Type Activity & Location					Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	TBD	TBD : TBD	-	-		1.430	Oct 2019	-		-		-	0.000	1.430	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.227		-		-		-	0.000	0.227	-
		Subtotal	-	-		1.657		-		-		-	0.000	1.657	N/A
Support (\$ in Millior	ıs)			FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Support Contract	TBD	TBD : TBD	-	-		3.343	Oct 2019	-		-		-	0.000	3.343	-
		Subtotal	-	-		3.343		-		-		-	0.000	3.343	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						5.000	5.000 - 0.000					5.000	IN/A		

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	vrmy			Date: February 2020						
Appropriation/Budget Activity 2040 / 4		R P N	R-1 Program Element (Number/Name) PE 0604644A / Mobile Medium Range MissileProject (Number/Name) MR1 / Mobile Intermediate Range Missile							
[
Event Name	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025			
Transition (Current and Planned Technologies)										
Assessment										

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Da	ate: Februar	y 2020	
ppropriation/Budget Activity R-1 P 040 / 4 PE 06 Missin	rogram Element (Numbe 304644A / Mobile Medium le	r/Name) Range	Project (Numl MR1 / Mobile	Number/Name) bile Intermediate Range Missil		
Schedule	Details					
	St	art		End		
Events	Quarter	Year	Quar	rter	Year	
Transition (Current and Planned Technologies)	1	1 2020		4	2020	
Assessment	2	2020	4	4	2020	

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	anced	R-1 Program Element (Number/Name) PE 0604785A <i>I Integrated Base Defense (Budget Activity 4)</i>										
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	0.000	2.000	0.000	2.020	2.020	0.000	0.000	0.000	0.000	0.000	4.020
DS4: Integrated Base Defense	-	0.000	2.000	0.000	2.020	2.020	0.000	0.000	0.000	0.000	0.000	4.020

A. Mission Description and Budget Item Justification

Integrated Base Defense (IBD) provides integration of software and analytical capability to support the integration of systems in the field. IBD employs an enterprise approach to enable IBD capabilities across the operational spectrum by leveraging interoperability efforts in support of the Integrated Unit, Base, and Installation Protection framework focused on system engineering and software development.

Counter Vehicle Borne Improvised Explosive Device (CVBIED) is an integrated suite of systems developed in response to CENTCOM JUONS CC-0540. CVBIED provides an early VBIED detection capability prior to vehicles reaching entry into Forward Operating Bases. Additional sensor systems are being integrated into the current Force Protection infrastructure as part of CVBIED.

Counter Vehicle Borne Improvised Explosive Device (CVBIED) is not a new start, the program was moved from Program Element 0605033A in FY 2018 and 0205402A in FY 2019.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	0.000	2.000	2.020	-	2.020
Current President's Budget	0.000	2.000	0.000	2.020	2.020
Total Adjustments	0.000	0.000	-2.020	2.020	0.000
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-	-			
 SBIR/STTR Transfer 	-	-			
 Adjustments to Budget Years 	-	-	-2.020	2.020	0.000

Change Summary Explanation

Counter Vehicle Borne Improvised Explosive Device (CVBIED) is not a new start, the program was moved from Program Element 0605033A in FY 2018 and 0205402A in FY 2019.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: February 2020		
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060478 (Budget Ad	am Elemen 35A / Integra ctivity 4)	t (Number /l nted Base D	Name) efense	Project (Number/Name) DS4 / Integrated Base Defense			
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
DS4: Integrated Base Defense	-	0.000	2.000	0.000	2.020	2.020	0.000	0.000	0.000	0.000	0.000	4.020
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Counter Vehicle Borne Improvised Explosive Device (CVBIED) is not a new start, the program was moved from Program Element 0605033A in FY 2018 and 0205402A in FY 2019.

A. Mission Description and Budget Item Justification

Integrated Base Defense (IBD) provides integration of software and analytical capability to support the integration of systems in the field. IBD employs an enterprise approach to enable IBD capabilities across the operational spectrum by leveraging interoperability efforts in support of the Integrated Unit, Base, and Installation Protection framework focused on system engineering and software development.

Counter Vehicle Borne Improvised Explosive Device (CVBIED) is an integrated suite of systems developed in response to CENTCOM JUONS CC-0540. CVBIED provides an early VBIED detection capability prior to vehicles reaching entry into Forward Operating Bases. Additional sensor systems are being integrated into the current Force Protection infrastructure as part of CVBIED.

OCO funding in the amount of \$2.020 million supports continued integration of CVBIED technologies into the current Force Protection infrastructure to address capabilities gaps with JUONS CC-0540.

Counter Vehicle Borne Improvised Explosive Device (CVBIED) is not a new start, the program was moved from Program Element 0605033A in FY 2018 and 0205402A in FY 2019.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2021	FY 2021
	FY 2019	FY 2020	Base	000	Total
Title: CVBIED Design and Build	-	2.000	0.000	2.020	2.020
Description: Effort continues the design and integration of CVBIED technologies into the current Force Protection infrastructure to address capabilities gaps within JUONS CC-0540					
FY 2020 Plans: Funding support continued integration of CVBIED technologies into the current Force Protection infrastructure to address capabilities gaps within JUONS CC-0540.					
FY 2021 Base Plans:					

Exhibit R-2A, RDT&E Project Jus	stification: PB			ruary 2020							
Appropriation/Budget Activity 2040 / 4				R-1 Pr PE 060 (Budge	r ogram Eler 04785A / Int et Activity 4)	nent (Numbe egrated Base	er/Name) Defense	Project (N DS4 / Integ			
B. Accomplishments/Planned Pr	ograms (\$ in N	<u>lillions)</u>					FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
No Base RDTE provided											
FY 2021 OCO Plans: Funding will support continued interinfrastructure to address capabilities	gration of CVB as gaps with JU	ED technol ONS CC-05	ogies into the	e current For	ce Protectio	n					
FY 2020 to FY 2021 Increase/Dec Inflationary increase over previous	c rease Statem budget year	ent:									
			Accomplis	nments/Plar	nned Progra	ams Subtotal	ls -	2.000	0.000	2.020	2.020
C. Other Program Funding Summ	nary (\$ in Milli	ons)									
Line Item • M90115: INTEG BASE DEF NONSTAND EQUIP (IBD NS-E) KITTING Remarks	<u>FY 2019</u> 39.200	FY 2020 39.984	FY 2021 Base 0.000	FY 2021 OCO 64.584	FY 2021 <u>Total</u> 64.584	<u>FY 2022</u> -	<u>FY 2023</u> -	<u>FY 2024</u> -	<u>FY 2025</u> -	Cost To Complete 0.000	<u>Total Cost</u> 143.768
D. Acquisition Strategy											

The IBD acquisition strategy is to leverage existing IBD-related government organizations and to competitively award multiple contracts in support of IBD objectives for the development of holistic IBD architectures and products to support interoperability of fielded and emerging IBD-related systems. JUONS CC-0540 (CVBIED) equipment is comprised of a combination of Commercial and Government Off the Shelf items integrated to meet the requirements of JUONS CC-0540 (CVBIED).

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Program Element (Number/Name)Project (Number/Name)PE 0604785A / Integrated Base DefenseDS4 / Integrated Base Defense(Budget Activity 4)DS4 / Integrated Base Defense									
Product Developme	nt (\$ in M	illions)		FY 2019		FY 2020		FY 2021 Base		FY	2021 CO	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
JUONS CC-0540 System Integration	MIPR	AMRDEC : Huntsville, AL	-	-		0.379	Jan 2020	0.000		0.400	Jan 2021	0.400	0.000	0.779	-
JUONS CC-0540 Hyper spectral Sensor Development Support	MIPR	RDECOM CERDEC : Fort Belvoir, VA	-	-		0.203	Jan 2020	0.000		0.500	Jan 2021	0.500	0.000	0.703	-
JUONS CC-0540 Wide Area Motion Imagery Sensor Development	MIPR	NAVAIR : Patuxent River, MD	-	-		0.608	Jan 2020	0.000		0.350	Jan 2021	0.350	0.000	0.958	-
Integrated System Architecture (ISA) SW Development Support	MIPR	NVESD : Fort Belvoir	-	-		-		0.000		0.270	Jan 2021	0.270	0.000	0.270	-
		Subtotal	-	-		1.190		0.000		1.520		1.520	0.000	2.710	N/A
Test and Evaluation	(\$ in Milli	ons)		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	ATEC : Aberdeen Proving Ground, MD	-	-		0.810	Jan 2020	0.000		0.500	Oct 2020	0.500	0.000	1.310	-
		Subtotal	-	-		0.810		0.000		0.500		0.500	0.000	1.310	N/A
	Prior Years FY 2019		2019	FY 2	2020	FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract		
		Project Cost Totals	-	-		2.000		0.000		2.020		2.020	0.000	4.020	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	Date: February 2020											
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (NPE 0604785A / Integrated Base DefenseDS4 / Integrated Base Defense(Budget Activity 4)DS4 / Integrated Base Defense						Number/Name) egrated Base Defense				
		-		EV 0004	514 0000					· ·		
Event Name	FY 2019	FY 20	4	FY 2021	FY 2022	1	- Y 2023	1	2 3 4		2 3	25
Development, Test and Integration	s	ystem Developme	ent and Co	omponent Integration					I I		ľ	
Integration Test Events	AVIS	Integration										
Video Analytics/Computer Learning Integration	Comp	uter Learning Inte	egration									
Fixed Control Station Integration		FCS Integration										
Facial Recognition/ RFID implementation			Facial F	Rec/RDIF marking								
Intelligent Remote Imaging Spectrometer- Ground and Kestrel B	lock II Phase I	IRIS-G and KB	32 Integrat	tion Phase I								
Intelligent Remote Imaging Spectrometer- Ground and Kestrel B	lock II Phase II		1	IRIS-G and KB2 Integratio	n Phase II							
GECO - NIDS Phase I				GECO - NIDS Integ	ration Phase I							
ATEC Capabilities and Limitations- Increment 1		IC	DTE Inc 1									
ATEC Capabilities and Limitations - Increment 2				IOTE Inc 2								

hibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date:	February 2020
propriation/Budget Activity 40 / 4	R-1 Program PE 0604785A (Budget Activit	Project (Numbe DS4 / Integrated	r/Name) Base Defense		
So	chedule Detail	S			
		S	tart		End
Events		Quarter	Year	Quarte	r Year
Development, Test and Integration		4	2019	4	2021
Integration Test Events		4	2019	4	2021
Video Analytics/Computer Learning Integration		4	2019	2	2020
Fixed Control Station Integration		1	2020	4	2021
Facial Recognition/ RFID implementation		4	2020	1	2021
Intelligent Remote Imaging Spectrometer- Ground and Kestrel Block II Pl	nase I	1	2020	4	2020
Intelligent Remote Imaging Spectrometer- Ground and Kestrel Block II Pl	nase II	1	2021	3	2021
GECO - NIDS Phase I		2	2021	4	2021
ATEC Capabilities and Limitations- Increment 1		3	2020	4	2020
ATEC Capabilities and Limitations - Increment 2		2	2021	3	2021

Exhibit R-2, RDT&E Budget Item	n Justificat	i on: PB 202	21 Army							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)				anced	R-1 Program Element (Number/Name) PE 0305251A / Cyberspace Operations Forces and Force Support							
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	-	52.817	52.102	50.525	-	50.525	48.644	50.411	49.966	50.529	0.000	354.994
FA8: Cyberspace Operations Forces and Force Support	-	52.817	52.102	50.525	-	50.525	48.644	50.411	49.966	50.529	0.000	354.994

A. Mission Description and Budget Item Justification

Persistent Cyber Training Environment (PCTE) supports the United States Cyber Command (USCC) by enabling a critical need for the DoD Cyber Mission Force (CMF) to train at the individual, team, and force level. The service cyber components have established their own training environments, but do not have standardized capabilities or content. PCTE will provide the Department of Defense (DoD) cyber forces with a standardized training capability that utilizes shared content across the Services to include emulated network environments and has the ability to connect to other range environments.. The PCTE platform is aligned to the outputs of the Office of the Under Secretary of Defense for Acquisition & Sustainment OUSD (A&S) and Chairman of the Joint Chiefs of Staff (CJCS) J6 led, "Cyber Range Evaluation of Alternatives (EOA) Findings and Issue Paper Deliberations," dated 17 November 2015. The Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) was designated as the DoD Acquisition Lead for the PCTE and the program is directed by the 2016 National Defense Authorization Act, Section 1645. With the JROC validation of the Information System - Capability Development Document (IS-CDD) on 4 November 2019, the PCTE program quickly achieved Milestone B on 6 December 2019.

FY 2021 will focus on adding capability into the platform releases while updating to support increased automation, scalability, and usability. Planned updates include an Intel capability, enhanced After Action Review (AAR), and Platform Enterprise services to increase realism of the training environment. The planned updates also include automation to refine the build out of PCTE which decreases manual processes. The PCTE platform will obtain accreditation at the Top Secret (TS) level to serve the critical need of DoD Cyber Mission Force (CMF) users to train at the TS data classification level. Platform licensing will be scaled to support the full DoD CMF user base which has resulted in a shift in funding.

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	52.817	52.102	53.578	-	53.578
Current President's Budget	52.817	52.102	50.525	-	50.525
Total Adjustments	0.000	0.000	-3.053	-	-3.053
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
 Reprogrammings 	-	-			
 SBIR/STTR Transfer 	-	-			
 Adjustments to Budget Years 	-	-	-3.053	-	-3.053

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0305251A / Cyberspace Operations Forces and Forc	e Support
Change Summary Explanation FY 2021 reduced to fund higher Army priorities.		

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name)Project (IPE 0305251A / Cyberspace OperationsFA8 / CybForces and Force SupportForce Support					Number/Name) perspace Operations Forces and pport		
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
FA8: Cyberspace Operations Forces and Force Support	-	52.817	52.102	50.525	-	50.525	48.644	50.411	49.966	50.529	0.000	354.994
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Persistent Cyber Training Environment (PCTE) supports the United States Cyber Command (USCC) by enabling a critical need for the DoD Cyber Mission Force (CMF) to train at the individual, team, and force level. The service cyber components have established their own training environments, but do not have standardized capabilities or content. PCTE will provide the Department of Defense (DoD) cyber forces with a standardized training capability that utilizes shared content across the Services to include emulated network environments and has the ability to connect to other range environments. The PCTE platform is aligned to the outputs of the Office of the Under Secretary of Defense for Acquisition & Sustainment OUSD (A&S) and Chairman of the Joint Chiefs of Staff (CJCS) J6 led, "Cyber Range Evaluation of Alternatives (EOA) Findings and Issue Paper Deliberations," dated 17 November 2015. The Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) was designated as the DoD Acquisition Lead for the PCTE and the program is directed by the 2016 National Defense Authorization Act, Section 1645. With the JROC validation of the Information System - Capability Development Document (IS-CDD) on 4 November 2019, the PCTE program quickly achieved Milestone B on 6 December 2019.

FY 2021 will focus on adding capability into the platform releases while updating to support increased automation, scalability, and usability. Planned updates include an Intel capability, enhanced After Action Review (AAR), and Platform Enterprise services to increase realism of the training environment. The planned updates also include automation to refine the build out of PCTE which decreases manual processes. The PCTE platform will obtain accreditation at the Top Secret (TS) level to serve the critical need of DoD Cyber Mission Force (CMF) users to train at the TS data classification level. Platform licensing will be scaled to support the full DoD CMF user base which has resulted in a shift in funding.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Title: Event Management for Persistent Cyber Training Environment (PCTE)	23.400	25.600	37.897
Description: Develop event scheduling, allocation, and management function for PCTE, to include event design, planning and execution, supported by standardized training assessment tools and capabilities.			
<i>FY 2020 Plans:</i> The expansion of the fielded PCTE capabilities will include the ability to have an automated opposition force that is reactive to the trainee and the capability of using near real-time intelligence to update training scenarios, Tactics, Techniques, and Procedures (TTPs). Will also provide the material solution to support the Technical Operations Management (TOM) capability.			
FY 2021 Plans:			

PE 0305251A: *Cyberspace Operations Forces and Force S...* Army

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army	Date: F	ebruary 2020)				
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0305251A / Cyberspace Operations Forces and Force Support	Project (Number/Name) FA8 / Cyberspace Operations Forces an Force Support					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021			
PCTE capabilities will be scaled to support the full DoD Cyber Mission Ford by the United States Cyber Command (USCC) and CMF feedback, will incl capabilities and improved Opposing Force Campaigns.	e (CMF) user base. New capabilities, as prioritize ude enhanced After Action Review (AAR), Intel	d					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding was increased to support the full DoD Cyber Mission Force user ba	ase.						
Title: Environment Operations and Management for Persistent Cyber Train	ing Environment (PCTE)	13.400	13.400	4.244			
Description: Develop PCTE with realistic vignettes/scenarios as part of a s that includes certification and real-world mission rehearsals.	system (syllabus) of individual and collective traini	ng					
FY 2020 Plans: Will continue to build and host persistent virtual environments that DoD Cytterrain. These high fidelity virtual environments allow realistic and relevant network or system environments. FY 2020 also continues to add more blue System (ICS), and Supervisory Control and Data Acquisitions (SCADA) virt events. Additional environments will be created based on priority per the vartelepresence, battlefield systems (blue and red), and commercial mobile.	per Mission Forces use as their training maneuver training on demand that are representative of act e environments, red environments, Industrial Contr tualizations to support multiple simultaneous traini alidated Initial Capability Document (ICD) that incl	ual ol ng ude					
FY 2021 Plans: PCTE virtual environments will be maintained, with limited expansion due to full DoD Cyber Mission Force (CMF) user base. PCTE will continue to integrinclude minor enhancements prioritized by user feedback.	o the increase in platform capabilities to support th grate virtual environments training resources which	ne n will					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding was reprioritized to support the increased scale of PCTE Event Ma Mission Force user base.	anagement capabilities to support the full DoD Cyl	ber					
Title: Physical and Virtual Connectivity for the Persistent Cyber Training Er	nvironment (PCTE)	10.500	10.600	6.592			
Description: PCTE has procured, installed and is maintaining Regional Co demand, reliable, and secure virtual access from wherever participants are infrastructure create a core cyber exercise network and event management training at the Unclassified, Secret, and Top Secret data classification level	ompute and Storage (RCS) nodes which enable or geographically located. Additionally, the PCTE Re t platform to support Cyber Mission Force (CMF) s.	n- CS					
FY 2020 Plans:							

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: I	ebruary 2020				
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0305251A / Cyberspace Operations Forces and Force Support	Project (Number/Name) FA8 / Cyberspace Operations Forces Force Support					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021			
Connectivity will continue to extend the PCTE capabilities to more regi the PCTE services to the National Guard and Reserve Cyber Mission I commercial cloud capabilities, and expansion onto DoD enterprise tran services.	onal or base training facilities. This also includes exten Forces (CMF) teams, expansion to Government or nsport capabilities to improve the reach of selected PC	ding FE					
FY 2021 Plans: Will maintain the current build out of the PCTE Regional Compute and transport services spanning multiple classification levels (Top Secret to	Storage (RCS) nodes while leveraging DoD enterprise o Unclassified) to perform training.						
FY 2020 to FY 2021 Increase/Decrease Statement: Funding was reprioritized to support the increased scale of PCTE Even Mission Force user base.	nt Management capabilities to support the full DoD Cyt	er					
Title: Persistent Cyber Training Environment (PCTE) Test and Evaluation	tion	5.517	2.502	1.792			
Description: Persistent Cyber Training Environment (PCTE) integration validation and verifications (V&V), limited user assessments (LUA), an incorporated throughout the Product Manager (PM) Development Ope (OTA) has been incorporated, in coordination with the Director, Operate testing leveraging DevOps testing processes.	on, development, and operational testing that will includ d testing in association with cyber training exercises an rations (DevOps) process. An Operational Test Autho tional Test and Evaluation (DOT&E), to conduct operat	le nd rity ional					
FY 2020 Plans: Testing will continue in FY 2020 through integration testing, validation serving as PCTE operational testing. Testing is essential in FY 2020 to existing PCTE platform and training capabilities. Testing will also focus the team/group and force levels.	and verifications, limited user assessments, and exerc o ensure that any fielded capability drop does not brea s more on the ability to conduct multiple training events	ses k the and					
FY 2021 Plans: Testing will continue in FY 2021 with integration, verification and validatis on verifying the modification of existing capability and the successful and operational assessments. PCTE will be transitioning from DevOps (DevSecOps) process, ensuring security testing is incorporated at the	ation testing of the PCTE capability. The focus for FY 2 I integration of new capability through developmental to into a more formal Development Security Operations lowest level to enable reliability and responsiveness.	021 esting					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding was reprioritized to support the increased scale of PCTE Even Mission Force user base.	nt Management capabilities to support the full DoD Cyt	er					
	Accomplishments/Planned Programs Sub	totals 52.817	52.102	50.525			

PE 0305251A: Cyberspace Operations Forces and Force S... Army

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army									Date: February 2020				
Appropriation/Budget Activity 2040 / 4				R-1 PI PE 03 <i>Forces</i>	r ogram Elen 05251A / Cy s and Force	nent (Numb berspace Op Support	er/Name) perations	Project (Number/Name) FA8 / Cyberspace Operations Forces and Force Support			rces and		
C. Other Program Funding Summ	ary (\$ in Milli	ons)											
			FY 2021	FY 2021	FY 2021					Cost To			
Line Item	<u>FY 2019</u>	FY 2020	Base	000	<u>Total</u>	<u>FY 2022</u>	FY 2023	FY 2024	FY 2025	Complete	Total Cost		
B65010: Persistent Cyber Training Environment	3.000	3.000	0.000	-	0.000	-	-	-	-	0.000	6.000		

<u>Remarks</u>

B65010-OPA2 -

Beginning FY 2021, OPA funds reprogrammed to Operations and Maintenance Army (OMA) (APE 151251000, MDEP VLWA) for software licensing for cyber training applications. PCTE has procured and installed the appropriate hardware infrastructure footprint to enable the platform to serve the Cyber Mission Force user base.

D. Acquisition Strategy

The Persistent Cyber Training Environment (PCTE) program will employ an incremental acquisition strategy. The current strategy leverages the use of existing cyber contracts and Other Transaction Authority (OTA) vehicles to provide specified capabilities that will be integrated into a cohesive training platform. The next step in the acquisition strategy is developing a long term contract vehicle that will continue enabling the PCTE platform to achieve scalability, optimization, innovation, and quality standards to meet the dynamic needs of the Cyber Mission Force (CMF) user base. The PM is in the process of awarding a Single Award Indefinite Delivery/Indefinite Quantity (ID/IQ) contract to serve PCTE as well as other cyber community customers called the Cyber Training, Readiness, Integration, Delivery, and Enterprise Technology (TRIDENT) contract in Q2FY2021. CYBER TRIDENT enables PCTE to provide iterative capability provided to the Cyber Mission Forces (CMF) in Capability Drops (CDs) that either improve or add features. These CDs will be based on requirements contained and further developed as part of the PCTE Information System - Capability Development Document (IS-CDD).

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Arm	y								Date:	February	/ 2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 030 Forces	ogram Ele 5251A / C and Force	e ment (N Cyberspa e Suppor	l umber/N ce Operat t	ame) tions	Project FA8 / C Force S	t (Numbe i Syberspace Support	r /Name) e Operati	ons Force	es and
Management Servic	es (\$ in M	lillions)		FY	2019	FY 2021 FY 2020 Base			FY 2021 OCO		FY 2021 Total]			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	TBD	Various : Various	2.300	-		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	2.300	-		-		-		-		-	Continuing	Continuing	N/A
Product Developme	nt (\$ in M	illions)		FY	2019	FY	2020	FY 2 Ba	2021 Ise	FY 2	2021 CO	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
PCTE Development and Integration	C/IDIQ	Various : Various	81.424	47.388	Feb 2019	49.602	Feb 2020	1.636	Feb 2021	-		1.636	Continuing	Continuing	Continuing
PCTE Cyber Training, Readiness, Integration, Delivery, and Enterprise Technology (TRIDENT)	C/IDIQ	Various : Various	-	-		-		16.000	Feb 2021	-		16.000	Continuing	Continuing	Continuing
PCTE Development and Integration - Other Transactional Authority	Option/ FFP	Various : Various	-	-		-		31.097	Oct 2020	-		31.097	Continuing	Continuing	Continuing
		Subtotal	81.424	47.388		49.602		48.733		-		48.733	Continuing	Continuing	N/A
Remarks PCTE will utilize existing c Test and Evaluation	ontracts in o	rder to provide the best	capabilities	available w	vithin the ma	arket until th	ne base cont 2020	ract is awar FY 2 Ba	ded in FY20 2021 Ise	020. FY 2	2021 CO	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
PCTE Government Test and Evaluation	Various	Various : Various	1.683	5.429	Mar 2019	2.500	Mar 2020	1.792	Mar 2021	-		1.792	Continuing	Continuing	Continuing
		Subtotal	1.683	5.429		2.500		1.792		-		1.792	Continuing	Continuing	N/A
PE 0305251A: Cybers	space Ope	erations Forces and	Force S.		UN		SIFIED								
Army	,					Page 7 d	of 11		R	-1 Line #	115				683

Appropriation/Budget Activity P-4 Program Element (Number/Name) Project (Number/Name) FAB / Cyberspace Operations Forces and Force Support Test and Evaluation (\$ in Millions) FY 2019 FY 2020 FY 2021 FY 2021 FY 2021 Cost Category Item A force Support Ocot Award Cost Award Cost Award Cost Cost Award Cost Cost Award Cost Cost Cost Award Cost Cost Cost Award Cost	Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Arm	y								Date:	February	2020	
Test and Evaluation (\$ in Millions) FY 2019 FY 2020 FY 2021 FY 2021 </td <td>Appropriation/Budge 2040 / 4</td> <td>et Activity</td> <td>/</td> <td></td> <td></td> <td></td> <td colspan="5">R-1 Program Element (Number/Name)Project (Number/Name)PE 0305251A / Cyberspace OperationsFA8 / CyberspaceForces and Force SupportForce Support</td> <td>(Number yberspace Support</td> <td>r/Name) e Operatio</td> <td>ons Force</td> <td>s and</td>	Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (Number/Name)PE 0305251A / Cyberspace OperationsFA8 / CyberspaceForces and Force SupportForce Support					(Number yberspace Support	r/ Name) e Operatio	ons Force	s and	
Contract Ocst Category Item Performing & Type Prior Cast Cost Award Date Cost Award Date Cost Award Date Cost Award Date Cost Cost Target Cost Value Cost Value Cost Value Date Cost Date Cost Award Date Cost Award Date Cost Award Date Cost Award Date Cost Cost Total Value Cost Value Cost Value Cost Value Cost Value Cost Cost Cost <td>Test and Evaluation</td> <td>(\$ in Milli</td> <td>ons)</td> <td></td> <td>FY 2</td> <td>2019</td> <td colspan="2">FY 2020</td> <td colspan="2">FY 2021 Base</td> <td>FY 2</td> <td colspan="2">FY 2021 OCO</td> <td></td> <td></td> <td></td>	Test and Evaluation	(\$ in Milli	ons)		FY 2	2019	FY 2020		FY 2021 Base		FY 2	FY 2021 OCO				
Protect Prior FY 2019 FY 2020 FY 2021 FY 2021 Cost Total Cost Value of Continuing Project Cost Totals 85.407 52.817 52.102 50.525 - 50.525 Continuing Continuing N/A Remarks	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
Prior Years FY 2019 FY 2019 FY 2020 S0.525 FY 2021 OC FY 2021 Cost To Complete Target Cost Contract Project Cost Totals 85.407 52.817 52.102 50.525 - 50.525 Continuing N/A Remarks	Remarks Validation and Verification PCTE will host limited excu	tests will be ursions durin	conducted with every ca g cyber exercises in ord	apability dro er to provid	p utilizing (e an operat	Cyber Missi tional evalu	on Force op ation ultima	erators and tely building	representa up to hosti	tives from th ng a major f	ie Operatio orce level e	nal Test Au exercise eve	thority.			
Project Cost Totals 85.407 52.817 52.102 50.525 - 50.525 Continuing N/A		Prior Years FY 2019				2019	FY	2020	FY 2 Ba	2021 ase	FY : Of	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Remarks			Project Cost Totals	85.407	52.817	52.817			50.525		-		50.525	Continuing	Continuing	N/A



Exhibit R-4, RDT&E Schedule Profile: Pl	B 2021 Army					Date: February	2020		
Appropriation/Budget Activity 2040 / 4	R-1 F PE 0 Force	Program Elemen 305251A / Cyber es and Force Sup	t (Number/Name) space Operations oport	Project (N FA8 / Cyb Force Sup	(Number/Name) berspace Operations Forces and upport				
Event Name	Event Name FY 2019 FY			FY 2022	FY 2023	FY 2024	FY 2025		
PCTE v10.0	1 2 3 4 1	2 3 4	1 2 3 4	1 2 3 4 1	2 3 4	1 2 3 4	1 2 3 4		
PCTE v11.0						PCTE	210.0		
PCTE v12.0							14. PCTE		

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Febru	uary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0305251A <i>Forces and Fo</i>	Element (Number I Cyberspace Op prce Support	er/Name) erations	Project (Number/Name) FA8 / Cyberspace Operations Forces an Force Support		
	Schedule Detail	S				
		St	tart	Er	nd	
Events	Quarter	Year	Quarter	Year		
Prototype Releases (A-C)		4	2018	4	2019	
PCTE vA		4	2018	4	2018	
PCTE vB		2	2019	2	2019	
PCTE vC		4	2019	4	2019	
Platform Releases (v1.0 ? vX.0)		2	2020	4	2025	
PCTE v1.0		2	2020	2	2020	
PCTE v2.0		4	2020	4	2020	
PCTE v3.0		2	2021	2	2021	
PCTE v4.0		4	2021	4	2021	
PCTE v5.0		2	2022	2	2022	
PCTE v6.0		4	2022	4	2022	
PCTE v7.0		2	2023	2	2023	
PCTE v8.0		4	2023	4	2023	
PCTE v9.0		2	2024	2	2024	
PCTE v10.0		4	2024	4	2024	
PCTE v11.0		2	2025	2	2025	
PCTE v12.0		4	2025	4	2025	

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army										Date: February 2020			
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)				anced	R-1 Program Element (Number/Name) PE 1206120A <i>I Assured Positioning, Navigation and Timing (PNT)</i>								
COST (\$ in Millions)Prior YearsFY 2019FY 2020Base					FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost	
Total Program Element	-	123.364	139.110	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	262.474	
FJ8: Assured Positioning, Navigation and Timing (PNT)	-	62.628	42.379	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	105.007	
FJ9: Dismounted A-PNT	-	15.384	28.758	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	44.142	
FK1: Pseudolites	-	0.953	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.953	
FK2: Mounted A-PNT	-	35.775	59.073	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	94.848	
FK3: Anti-Jam Antenna	-	8.624	8.900	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	17.524	

<u>Note</u>

Program Element (PE) 1206120A transitions to PE 0604120A beginning in FY21.

A. Mission Description and Budget Item Justification

Assured Positioning, Navigation and Timing (A-PNT) provides Army ground maneuver forces access to assured PNT information under conditions where space-based PNT Global Positioning System (GPS) may be limited or denied (jammed and spoofed). A-PNT products are ruggedized tactical systems that enable Army forces at echelon the ability to shoot, move, communicate, and protect their forces to penetrate and dis-integrate enemy anti-access systems, thereby allowing them to maneuver from operational and strategic distances to close with, destroy, and exploit the enemy in close and deep maneuver areas with sufficient combat bower, tempo, and momentum. A-PNT addresses two critical capability gaps: Access and Integrity. Access is the ability to retrieve accurate PNT information in a contested Electronic Warfare/Cyber environment. Integrity is the ability to trust the PNT information. PNT is a critical enabler of many Army Maneuver, Fires, and Command and Control systems that are dependent on accurate Position and Timing, and a foundational Multi-Domain Battle capability to support: calibrated force posture (position and maneuver across strategic distances); multi-domain formations (operate in contested spaces against near-peer adversaries); convergence (continuous integration of capabilities in all domains). The current Global Positioning System (GPS) capability is a fixed frequency system susceptible to electronic warfare and field environments (e.g. urban, dense vegetation).

Joint Requirements Oversight Council Memo (JROCM) 049-10, dated 05 April 2010, approved the PNT Assurance Initial Capabilities Document and designated the Army as the Lead Component for Assured PNT. Army Futures Command approved the Mounted A-PNT System (MAPS) Directed Requirement (DR) on 13 January 2019. The Dismounted A-PNT System (DAPS) Directed Requirement was approved 05 April 2019. The Alternative Navigation (ALTNAV) Directed Requirement was approved in November 2019. MAPS transitions to a Capability Development Document (CDD) in June 2020 and DAPS transitions in FY 2021.

Assured Positioning, Navigation and Timing (A-PNT) consists of:

(FJ8) - The Assured PNT project funding line is for: PNT System of Systems Architecture (SOSA) Testing to validate performance of end-to-end system performance; Resiliency and Software Assurance Measures (RSAM) upgrades to legacy GPS systems. In addition, this line supports the development of complementary and

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Exhibit R-2, RDT&E Budget Item Justification: PB 2021	Army	1		Date:	February 2020
Appropriation/Budget Activity		R-1 Program El	ement (Number/Name)		
2040: Research, Development, Test & Evaluation, Army I B	A 4: Advanced	PE 1206120A <i>I A</i>	Assured Positioning, Na	vigation and Timing (PN	NT)
Component Development & Prototypes (ACD&P)					
adjacent A-PNT technologies as well as Enterprise Enable	rs including the Alter	native Navigatior	n (ALT NAV) signal Ente	erprise Build-out. These	e technologies will be
integrated into future products, strategies, concepts of oper	ration, architectures,	and platforms to	assure PN1.		
(FJ9) - Dismounted Assured PNT (A-PNT) System (DAPS)	will provide the Solo	diers equipped wi	ith Nett Warrior and othe	er Soldier architecture c	compliant systems
(e.g.Integrated Visual Augmentation System (IVAS)) condu	icting operations out	side of vehicles,	unhindered access the	critical timing and position	on data to effectively
engage targets, share data across the network and conduc	t mission command	functions.			·
(FK1) - The Pseudolite project was terminated by the Army	y on 12 February 20	19.			
(FK2) - The Mounted Assured Positioning Navigation and	Timing (PNT) Syste	m (MAPS) is a nl	atform-mounted rugge	dized tactical PNT syste	m which provides
(FNZ) - THE WOULLEU ASSULEU FOSILIOHING, NAVIGALIOH, AND	Tilling (FINT) Syste	(INAFS) is a pi	and a manuficate in a C	Sized lactical FINT Syste	en which provides
electronic protection canabilities that enable combatant cor	mmanders the ability	i to move choot			
electronic protection capabilities that enable combatant cor	nmanders the ability	to move, shoot,	and communicate in a C	Siodal Positioning Syste	em (GPS) challenged c
electronic protection capabilities that enable combatant cor denied environments.	mmanders the ability	to move, snoot, a	and communicate in a C	Siddal Positioning Syste	em (GPS) challenged c
electronic protection capabilities that enable combatant cor denied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G	nmanders the ability PS signal point prote	ection and PNT A	and communicate in a C	environments through	Anti-Jam technologies
electronic protection capabilities that enable combatant con denied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a	nmanders the ability PS signal point prote acquisition in challen	ection and PNT A	And communicate in a C Assurance in challenged s. The AJAS will assist i	environments through	Anti-Jam technologies assured PNT capabilit
electronic protection capabilities that enable combatant con denied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a to mounted platforms over time in an iterative, affordable m	nmanders the ability PS signal point protect acquisition in challen nanner that allows fo	ection and PNT A ged environments r future moderniz	Assurance in challenged s. The AJAS will assist i ation.	environments through a delivering distributed	Anti-Jam technologies assured PNT capabilit
 electronic protection capabilities that enable combatant condenied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a to mounted platforms over time in an iterative, affordable m B. Program Change Summary (\$ in Millions) 	mmanders the ability PS signal point prote acquisition in challen nanner that allows fo FY 2019	ection and PNT A ged environments r future moderniz <u>FY 2020</u>	Assurance in challenged s. The AJAS will assist i ation. FY 2021 Base	environments through and elivering distributed	Anti-Jam technologies assured PNT capabilit
electronic protection capabilities that enable combatant con denied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a to mounted platforms over time in an iterative, affordable m B. Program Change Summary (\$ in Millions) Previous President's Budget	mmanders the ability PS signal point protect acquisition in challen nanner that allows fo <u>FY 2019</u> 128.640	ection and PNT A ged environments r future moderniz <u>FY 2020</u> 192.562	Assurance in challenged s. The AJAS will assist i ation. <u>FY 2021 Base</u> 221,875	environments through n delivering distributed	Anti-Jam technologies assured PNT capabilit <u>FY 2021 Total</u> 221.875
electronic protection capabilities that enable combatant con denied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a to mounted platforms over time in an iterative, affordable m <u>B. Program Change Summary (\$ in Millions)</u> Previous President's Budget Current President's Budget	mmanders the ability PS signal point protect acquisition in challen nanner that allows fo <u>FY 2019</u> 128.640 123.364	ection and PNT A ged environments r future moderniz <u>FY 2020</u> 192.562 139.110	Assurance in challenged s. The AJAS will assist i ation. <u>FY 2021 Base</u> 221.875 0.000	environments through n delivering distributed <u>FY 2021 OCO</u>	Anti-Jam technologies assured PNT capabilit <u>FY 2021 Total</u> 221.875 0.000
 electronic protection capabilities that enable combatant condenied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a to mounted platforms over time in an iterative, affordable m B. Program Change Summary (\$ in Millions) Previous President's Budget Current President's Budget Total Adjustments 	mmanders the ability PS signal point protection acquisition in challen nanner that allows fo <u>FY 2019</u> 128.640 123.364 -5.276	ection and PNT A ged environments r future moderniz <u>FY 2020</u> 192.562 139.110 -53.452	And communicate in a C Assurance in challenged s. The AJAS will assist i ation. <u>FY 2021 Base</u> 221.875 0.000 -221.875	environments through n delivering distributed <u>FY 2021 OCO</u> - -	Anti-Jam technologies assured PNT capabilit <u>FY 2021 Total</u> 221.875 0.000 -221.875
 electronic protection capabilities that enable combatant condenied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a to mounted platforms over time in an iterative, affordable m B. Program Change Summary (\$ in Millions) Previous President's Budget Current President's Budget Total Adjustments Congressional General Reductions 	mmanders the ability PS signal point protection acquisition in challen nanner that allows fo <u>FY 2019</u> 128.640 123.364 -5.276	ection and PNT A ged environments r future moderniz <u>FY 2020</u> 192.562 139.110 -53.452	Assurance in challenged s. The AJAS will assist i ation. <u>FY 2021 Base</u> 221.875 0.000 -221.875	environments through n delivering distributed <u>FY 2021 OCO</u> - - -	Anti-Jam technologies assured PNT capabilit <u>FY 2021 Total</u> 221.875 0.000 -221.875
 electronic protection capabilities that enable combatant condenied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a to mounted platforms over time in an iterative, affordable m B. Program Change Summary (\$ in Millions) Previous President's Budget Current President's Budget Total Adjustments Congressional General Reductions Congressional Directed Reductions 	mmanders the ability PS signal point protect acquisition in challen nanner that allows fo <u>FY 2019</u> 128.640 123.364 -5.276 -	ection and PNT A ged environments r future moderniz <u>FY 2020</u> 192.562 139.110 -53.452 -	Assurance in challenged s. The AJAS will assist i ation. FY 2021 Base 221.875 0.000 -221.875	environments through n delivering distributed <u>FY 2021 OCO</u> - - -	Anti-Jam technologies assured PNT capabilit <u>FY 2021 Total</u> 221.875 0.000 -221.875
 electronic protection capabilities that enable combatant condenied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a to mounted platforms over time in an iterative, affordable m B. Program Change Summary (\$ in Millions) Previous President's Budget Current President's Budget Total Adjustments Congressional General Reductions Congressional Directed Reductions Congressional Rescissions 	mmanders the ability PS signal point protect acquisition in challen nanner that allows fo <u>FY 2019</u> 128.640 123.364 -5.276 - -	ection and PNT A ged environments r future moderniz <u>FY 2020</u> 192.562 139.110 -53.452 - -53.452	Assurance in challenged s. The AJAS will assist i ation. FY 2021 Base 221.875 0.000 -221.875	environments through n delivering distributed <u>FY 2021 OCO</u> - - -	Anti-Jam technologies assured PNT capabilit <u>FY 2021 Total</u> 221.875 0.000 -221.875
electronic protection capabilities that enable combatant con denied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a to mounted platforms over time in an iterative, affordable m B. Program Change Summary (\$ in Millions) Previous President's Budget Current President's Budget Total Adjustments • Congressional General Reductions • Congressional Directed Reductions • Congressional Rescissions • Congressional Adds	mmanders the ability PS signal point proto acquisition in challen nanner that allows fo <u>FY 2019</u> 128.640 123.364 -5.276 - - -	ection and PNT A ged environments r future moderniz <u>FY 2020</u> 192.562 139.110 -53.452 - -53.452 -	Assurance in challenged s. The AJAS will assist i ation. <u>FY 2021 Base</u> 221.875 0.000 -221.875	environments through n delivering distributed <u>FY 2021 OCO</u> - - -	Anti-Jam technologies assured PNT capabilit <u>FY 2021 Total</u> 221.875 0.000 -221.875
 electronic protection capabilities that enable combatant condenied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a to mounted platforms over time in an iterative, affordable m B. Program Change Summary (\$ in Millions) Previous President's Budget Current President's Budget Total Adjustments Congressional General Reductions Congressional Directed Reductions Congressional Adds Congressional Directed Transfers 	mmanders the ability PS signal point protection acquisition in challen nanner that allows fo <u>FY 2019</u> 128.640 123.364 -5.276 - - - - - - -	ection and PNT A ged environments r future moderniz <u>FY 2020</u> 192.562 139.110 -53.452 - - -53.452 -	And communicate in a Consumance in challenged s. The AJAS will assist i ation. <u>FY 2021 Base</u> 221.875 0.000 -221.875	environments through n delivering distributed <u>FY 2021 OCO</u> - - -	Anti-Jam technologies assured PNT capabilit <u>FY 2021 Total</u> 221.875 0.000 -221.875
electronic protection capabilities that enable combatant con denied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a to mounted platforms over time in an iterative, affordable m B. Program Change Summary (\$ in Millions) Previous President's Budget Current President's Budget Total Adjustments • Congressional General Reductions • Congressional Directed Reductions • Congressional Rescissions • Congressional Adds • Congressional Directed Transfers • Reprogrammings	nmanders the ability PS signal point prot- acquisition in challen nanner that allows fo <u>FY 2019</u> 128.640 123.364 -5.276 - - - - - - - - - - - -5.276	r to move, snoot, a ged environments r future moderniz <u>FY 2020</u> 192.562 139.110 -53.452 - - -53.452 - - -	Assurance in challenged s. The AJAS will assist i ation. <u>FY 2021 Base</u> 221.875 0.000 -221.875	environments through n delivering distributed <u>FY 2021 OCO</u> - - -	Anti-Jam technologies assured PNT capabilit <u>FY 2021 Total</u> 221.875 0.000 -221.875
electronic protection capabilities that enable combatant con denied environments. (FK3) - The Anti-Jam Antenna Systems (AJAS) provides G AJAS enables tactical capabilities through assured signal a to mounted platforms over time in an iterative, affordable m B. Program Change Summary (\$ in Millions) Previous President's Budget Current President's Budget Total Adjustments • Congressional General Reductions • Congressional Directed Reductions • Congressional Rescissions • Congressional Adds • Congressional Directed Transfers • Reprogrammings • SBIR/STTR Transfer	mmanders the ability PS signal point protect acquisition in challen nanner that allows fo <u>FY 2019</u> 128.640 123.364 -5.276 - - - - - - - - - - - - - - - - - - -	ection and PNT A ged environments r future moderniz <u>FY 2020</u> 192.562 139.110 -53.452 - - -53.452 - - - - - -	Assurance in challenged s. The AJAS will assist i ation. FY 2021 Base 221.875 0.000 -221.875	environments through n delivering distributed <u>FY 2021 OCO</u> - - -	Anti-Jam technologies assured PNT capabilit <u>FY 2021 Total</u> 221.875 0.000 -221.875

Change Summary Explanation

Program Element (PE) 1206120A transitions to PE 0604120A beginning in FY21.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4R-1 Program Element (Number/Name) PE 1206120A / Assured Positioning, Navigation and Timing (PNT)Project (Number/Name) FJ8 / Assured Positioning, Timing (PNT)						ne) hing, Naviga	tion and					
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
FJ8: Assured Positioning, Navigation and Timing (PNT)	-	62.628	42.379	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	105.007
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

Program Element (PE) 1206120A project FJ8, planned program title Assured Positioning, Navigation and Timing Enterprise Enablers transitions to PE 0604120A project BV4 beginning in FY21.

Program Element (PE) 1206120A project FJ8, planned program title PNT System of System (SOSA) Testing and Resiliency and Software Assurance Measures (RSAM) transitions to PE 0604120A project ED5 beginning in FY21.

A. Mission Description and Budget Item Justification

The Assured Positioning, Navigation and Timing (PNT) project funds the Resiliency and Software Assurance Measures (RSAM) which provides increased capability and situational awareness for 500,000+ fielded legacy military Global Positioning System (GPS) receivers supporting systems and soldiers through at least 2035. Legacy GPS receivers targeted for RSAM enhancements, include but are not limited to, 226,000 Defense Advanced GPS Receiver (DAGR) and 200,000+ embedded Ground Based-GPS Receiver Applications Module (GB-GRAM). RSAM mitigates risks in a GPS-challenged operational environment until future Positioning, Navigation and Timing (PNT) solutions are fully deployed. This line also funds the Assured PNT enablers which includes prototype development and testing to demonstrate and prove emerging capabilities for legacy and future PNT resilient solutions. Assured PNT enablers also includes the Alternative Navigation signal enterprise build-out, providing PNT data in a denied or degraded environment.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: PNT System of System (SOSA) Testing and Resiliency and Software Assurance Measures (RSAM)	31.642	21.030	-	-	-
Description: The effort supports SOSA testing, RSAM and other Army PNT capabilities.					
FY 2020 Plans: FY 2020 base funds support continued Update 2 software development against emerging threats for Defense Advanced GPS Receiver (DAGR) and Ground Based GPS Receiver Application Module (GB-GRAM/ MicroGRAM).					
PNT Systems of Systems (SOSA) testing and Resiliency and Software Assurance Measures (RSAM) will complete software development Update 1 for GB-GRAM and continue software development for MicroGRAM, to include engineering build testing, formal qualification testing, and risk mitigation efforts for platforms utilizing					

PE 1206120A: Assured Positioning, Navigation and Timi... Army

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020					
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/ PE 1206120A <i>I Assured Positionin</i> <i>Navigation and Timing (PNT)</i>	Name) ng,	Project (N FJ8 / Assu Timing (PN	e ct (Number/Name) Assured Positioning, Navigation an g (PNT)			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	
Defense Advanced GPS Receiver (DAGR) and GB-GRAM. In addition, DAGR integration testing efforts will be performed in association with relevant platform	RSAM and GB-GRAM RSAM						
FY 2020 to FY 2021 Increase/Decrease Statement: RDT&E funding decreased from \$21.992 million in FY 2020 to \$0.0 million in F 0604120A project ED5.	FY 2021 due to transitioning to PE						
Title: Assured Positioning, Navigation and Timing (PNT) Enterprise Enablers a	and Build-out	27.955	19.425	-	-	-	
 Description: Enterprise Enablers provide enhanced PNT capability across an These materiel solutions may augment or replace GPS by providing complementary PNT providers, Enterprise Enablers build resiliency and robus to ensure Soldiers have the right PNT information to drive mission success. FY 2020 Plans: FY 2020 Base funds will continue through market research, prototyping, experidemonstrations of ALT NAV, emerging situational awareness capabilities and solutions will leverage commercial capabilities, existing contracts, industry, acai iterative process, that will be integrated into future products, strategies, concept and platforms to assure PNT. Other efforts include the continuation of Situations spectrum modification for PNT solutions (Alternative PNT Banding) and model 	operational enterprise. entary PNT information. As tness by diversifying PNT sources imentation, and technical net-enabled GPS solutions. These ademia, and the warfighter in an ots of operation, architectures, onal Awareness development, ling and simulation support for						
FY 2020 to FY 2021 Increase/Decrease Statement: RDT&E funding decreased from \$20.387 million in FY 2020 to \$0.0 million in F 0604120A project BV4.	FY 2021 due to transitioning to PE						
<i>Title:</i> FY 2018 NDAA SEC 825		0.118	-	-	-	-	
Description: FY 2018 NDAA SEC 825							
Title: FY 2019 Rescission		2.913	-	-	-	-	
Title: FY 2020 SBIR/STTR Transfer		-	1.924	-	-	-	
Description: Funding transferred in accordance with Title 15 USC ?638							
FY 2020 Plans:							

PE 1206120A: Assured Positioning, Navigation and Timi... Army

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Exhibit R-2A, RDT&E Project Jus	tification: PB	2021 Army							Date: Feb	oruary 2020	
Appropriation/Budget Activity 2040 / 4		R-1 Pi PE 12 <i>Naviga</i>	r ogram Eler 06120A / As ation and Tir	ment (Numbe sured Position ming (PNT)	Project (N FJ8 / Assu Timing (PN	Number/Name) ured Positioning, Navigation and 'NT)					
B. Accomplishments/Planned Pro	ograms (\$ in N	<u>Millions)</u>					FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding transferred in accordance	with Title 15 U	SC ?638									
FY 2020 to FY 2021 Increase/Dec Funding transferred in accordance	rease Statem with Title 15 U	ent: SC ?638									
			Accomplis	hments/Plai	nned Progra	ams Subtotal	s 62.628	42.379	-	-	-
C. Other Program Funding Summ	nary (\$ in Milli	<u>ons)</u>	FY 2021	FY 2021	FY 2021				^ 	Cost To	
Line Item • K49010: Mounted/ Dismounted Receivers	<u>FY 2019</u> -	FY 2020 1.724	Base 5.894	000	<u>Total</u> 5.894	<u>FY 2022</u> 7.193	FY 2023 7.075	FY 2024 2.370	FY 2025 2.394	Continuing	Total Cost Continuing

<u>Remarks</u>

K49010: Mounted/Dismounted Receivers is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

D. Acquisition Strategy

The planned acquisition strategy for Positioning, Navigation and Timing (PNT) System of Systems Architecture (SOSA) testing and Resiliency and Software Assurance Measures (RSAM) implementation is to award sole source contracts to the original equipment manufacturers and leverage the Communications Electronics Research Development Engineering Center (CERDEC) to develop and evaluate solutions to enhance the resiliency of Global Positioning System (GPS)-dependent systems operating in evolving contested environments. PNT SOSA testing and RSAM implementation will complete software development for Defense Advanced GPS Receiver (DAGR), Ground Based GPS Receiver Applications Module (GB-GRAM), and MicroGRAM to include engineering build testing and formal qualification testing, as well as integration and integration testing, for platforms utilizing DAGR, GB-GRAM and MicroGRAM engineering builds.

The Assured PNT Enterprise Enablers project will conduct market research, prototyping, experimentation, and technical demonstrations of Alternative Navigation (ALT NAV), emerging situational awareness capabilities and net-enabled GPS solutions. These solutions will leverage commercial capabilities, existing contracts, industry, academia, and the warfighter in an iterative process, that will be integrated into future products, strategies, concepts of operation, architectures, and platforms to assure PNT.

The Assured PNT Enterprise Build-out will conduct network integration, installation and testing of the assured timing/location modular enterprise capability for ALT NAV. ALT NAV provides positioning, navigation and timing data in a denied or degraded environment. Enterprise Buildout will be completed to enable ALT NAV capabilities.

PE 1206120A: Assured Positioning, Navigation and Timi... Army

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	021 Arm	ıy								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 1206120A / Assured Positioning, Navigation and Timing (PNT)Project (Number/Name) FJ8 / Assured Positioning, Navigation 									
Management Services (\$ in Millions)		FY 2019		FY 2020		FY 2021 Base		FY 2 O	2021 CO	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 Management Support	Allot	PM PNT : Various	-	3.056	Jan 2019	2.314	Jan 2020	-		-		-	0.000	5.370	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	TBD : TBD	-	0.118		-		-		-		-	0.000	0.118	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.924		-		-		-	0.000	1.924	-
		Subtotal	-	3.174		4.238		-		-		-	0.000	7.412	N/A
Product Development (\$ in Millions)		FY 2019		FY 2020		FY 2021 Base		FY 2 O	021 FY 2021 O Total						
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award		Award Date Cost		Cost To Complete	Total Cost	Target Value of Contract
RSAM - DAGR Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	-	2.102	Apr 2019	4.709	Dec 2019	-		-		-	0.000	6.811	-
RSAM - GB-GRAM Software Development	SS/CPIF	Rockwell Collins : Cedar Rapids, IA	-	0.272	Sep 2019	2.084	Feb 2020	-		-		-	0.000	2.356	-
Assured PNT Enterprise Enablers	C/FFP	Various : Various	-	-		20.194	Dec 2019	-		-		-	0.000	20.194	-
Assured PNT Enterprise Buildout	MIPR	Various : Various	-	27.955	May 2019	-		-		-		-	0.000	27.955	-
Army Modernization Priorities	MIPR	Rockwell Collins : Cedar Rapids, IA	-	2.034	Mar 2019	-		-		-		-	0.000	2.034	-
FY 2019 Pending Rescission	TBD	TBD : TBD	-	2.913	May 2019	-		-		-		-	0.000	2.913	-
		Subtotal	-	35.276		26.987		-		-		-	0.000	62.263	N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 1206120A I Assured Positioning, Navigation and Timing (PNT)Project (Number/Name) FJ8 I Assured Positioning, Navigation 									
Support (\$ in Million	s)			FY 2019		FY 2020		FY 2021 Base		FY 2 OC	2021 CO	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 Technical Contracting Services	C/FFP	DCS Corp : APG, MD	-	9.110	Jan 2019	2.785	Jan 2020	-		-		-	0.000	11.895	-
Engineering and Technical Government Services	MIPR	C4ISR : Various	-	6.833	Jan 2019	0.033	Jan 2020	-		-		-	0.000	6.866	-
Assured PNT Enterprise Enablers Contractor Engineering Support	Various	DCS Corporation : APG, MD	-	0.328	Jan 2019	-		-		-		-	0.000	0.328	-
		Subtotal	-	16.271		2.818		-		-		-	0.000	19.089	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
SOSA Testing/RSAM - Government Eng Support	MIPR	Various : Various	-	0.826	Jan 2019	2.477	Jan 2020	-		-		-	0.000	3.303	-
SOSA Testing/RSAM - Contractor Eng Support	C/CPFF	Various : Various	-	1.276	Jan 2019	1.672	Jan 2020	-		-		-	0.000	2.948	-
Platform Integration Testing	C/Various	Various : Various	-	3.700	Mar 2019	4.086	Mar 2020	-		-		-	0.000	7.786	-
SOSA Testing/RSAM Test Equipment	C/Various	Various : Various	-	0.191	Apr 2019	0.101	Jun 2020	-		-		-	0.000	0.292	-
Assured PNT Enterprise Buildout Test Support	C/Various	Various : Various	-	1.914	Aug 2019	-		-		-		-	0.000	1.914	-
		Subtotal	-	7.907		8.336		-		-		-	0.000	16.243	N/A
			Prior Years	FY	2019	FY 2	2020	FY 2 Ba	2021 Ise	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	62.628		42.379		-		-		-	0.000	105.007	N/A
Remarks															

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army									Date: February 2020												
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Program Element (Number/Name)PE 1206120A / Assured Positioning, Navigation and Timing (PNT)FJ										Project (Number/Name) FJ8 I Assured Positioning, Navigation and Timing (PNT)									
Event Name	FY 2019	FY 20	20	FY 2022				FY 2	2023		FY 2024			F١	(202	25					
Event Name	1 2 3 4	1 2 3	4	1	2 3	4	1	2	3 4	1	2	3 4	1	2	3 4	1	2	3	4		
PNT System of Sytems Architecture (SOSA) Testing	SOSA Testing																				
RSAM - DAGR Software Development and Testing	DAGR Software Develop	nent and Testing																			
RSAM DAGR Update 1 Software Release		DA	GR Updat	te 1																	
RSAM - GB-GRAM/MicroGRAM Software Development and Tes	t GB-GRAM/MicroGRAM S	oftware Developm	ent and T	Testing																	
RSAM GB-GRAM Update 1 Software Release		GB-	2 GRAM U	odate 1																	
RSAM MicroGRAM Update 1 Software Release			,	3 Micro GR/	AM Update	1															
Platform Integration Testing	Platform Integration Testi	ng																			
Army Enterprise Enablers	Army Enterprise Enablers																				
Note																					

Program Element (PE) 1206120A project FJ8, planned program title Assured Positioning, Navigation and Timing Enterprise Enablers transitions to PE 0604120A project BV4 beginning in FY21.

PE 1206120A: Assured Positioning, Navigation and Timi... Army UNCLASSIFIED Page 8 of 32

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army	Date: February 2020						
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)					
2040 / 4	PE 1206120A / Assured Positioning,	FJ8 I Assured Positioning, Navigation and					
	Navigation and Timing (PNT)	Timing (PNT)					

Program Element (PE) 1206120A project FJ8, planned program title PNT System of System (SOSA) Testing and Resiliency and Software Assurance Measures (RSAM) transitions to PE 0604120A project ED5 beginning in FY21.
Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army					Date: Febru	ary 2020
Appropriation/Budget Activity 2040 / 4	R-1 Program Eleme PE 1206120A <i>I Assu</i> <i>Navigation and Timi</i>	ent (Number ured Position ng (PNT)	r /Name) ing,	Project (Nu FJ8 / Assur Timing (PN	umber/Name red Positionii T)	e) ng, Navigation and
So	chedule Details					
		Sta	art		En	d
Events	C	Quarter	Year	Q	uarter	Year
PNT System of Sytems Architecture (SOSA) Testing		1	2019		4	2020
RSAM - DAGR Software Development and Testing		1	2019		4	2020
RSAM DAGR Update 1 Software Release		3	2020		3	2020
RSAM - GB-GRAM/MicroGRAM Software Development and Testing		1	2019		4	2020
RSAM GB-GRAM Update 1 Software Release		3	2020		3	2020
RSAM MicroGRAM Update 1 Software Release		1	2021		1	2021
Platform Integration Testing		1	2019		4	2020
Army Enterprise Enablers		1	2019		4	2021

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	rmy							Date: Febr	uary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 120612 Navigation	am Elemen 20A / Assure and Timing	t (Number/ ed Positionii (PNT)	Name) ng,	Project (N FJ9 <i>I Dism</i>	umber/Nan ounted A-P	ne) NT	
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
FJ9: Dismounted A-PNT	-	15.384	28.758	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	44.142
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

Program Element (PE) 1206120A project FJ9 transitions to PE 0604120A project EH8 beginning in FY 2021.

A. Mission Description and Budget Item Justification

Dismounted Assured PNT (A-PNT) System (DAPS) implements congressional and OSD guidance to develop and field Military Code (M-Code) Ground User Equipment (MGUE) receivers and provides the Soldiers equipped with Nett Warrior (NW) and other Soldier architecture compliant systems (e.g. Integrated Visual Augmentation System (IVAS)) the critical timing and position data to effectively engage targets, share data across the network, and conduct mission command functions. DAPS is planned to be a size, weight and power (SWaP) optimized form-factor that paces the threats and includes development and integration of Global Positioning System (GPS) and non-GPS sensors. DAPS integrates with the NW system and other Soldier architecture compliant systems, and distributes PNT information to the End-User Device (EUD). DAPS includes receiver software capable of fusing sensors and Global Navigation Satellite Systems (GNSS) signals resulting in additional integrity for military GPS in denied environments and includes a M-Code receiver solution, or a Selective Availability Anti-Spoofing Module (SAASM) system with growth path to M-Code.

Through an iterative approach, DAPS will continue to fuse M-Code, GNSS, and non-GPS sensors, as well as fuse Alternate Navigation (ALTNAV) and other complementary PNT sources in a SWaP constrained system in order to pace/overmatch the threat and continue to deliver critical timing and position data to effectively engage targets, share data across the network, and conduct mission command functions.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2021	FY 2021
	FY 2019	FY 2020	Base	000	Total
Title: Dismounted A-PNT System (DAPS)	15.384	27.452	-	-	-
 Description: This effort supports the development and delivery of DAPS prototypes for integration, evaluation and performance testing. FY 2020 Plans: FY 2020 Base funds will deliver Dismounted A-PNT prototypes, conduct laboratory, performance and reliability tests. Safety Pelease and New Equipment Training will be completed. Nett Warrier Hardware and Software. 					
integration will be completed followed by final testing in FY 2021. Other efforts include: requirement/design trade					

Exhibit R-2A, RDT&E Project Justi	ification: PB	2021 Army							Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4				R-1 Pr PE 12 <i>Naviga</i>	ogram Eler 06120A / As ation and Tir	nent (Numbe sured Position ning (PNT)	r /Name) ning,	Project (N FJ9 / Dism	umber/Na ounted A-F	me) PNT	
B. Accomplishments/Planned Pro	grams (\$ in N	<u>/lillions)</u>					FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
studies and early prototyping for use and HUD 3.0 architecture efforts will	r demonstrati continue.	ons of a sta	nd-alone Ha	ndheld varia	nt. Integrati	on of IVAS					
FY 2020 to FY 2021 Increase/Decre RDT&E funding decreased from \$32 0604120A project EH8.	ease Statem 2.360 million in	e <i>nt:</i> n FY 2020 to	\$0.0 millior	n in FY 2021	due to trans	itions to PE					
Title: FY 2020 SBIR/STTR Transfer							-	1.306	-	-	-
Description: Funding transferred in	accordance v	vith Title 15	USC ?638								
<i>FY 2020 Plans:</i> Funding transferred in accordance w	vith Title 15 U	SC ?638									
FY 2020 to FY 2021 Increase/Decre Funding transferred in accordance w	ease Statem vith Title 15 U	ent: SC ?638									
			Accomplis	hments/Plar	nned Progra	ams Subtotal	s 15.384	28.758	-	-	-
C. Other Program Funding Summa	ary (\$ in Milli	ons)									
Line Item • K49020: Dismounted Hub Remarks	<u>FY 2019</u> -	<u>FY 2020</u> -	<u>FY 2021</u> <u>Base</u> 48.449	<u>FY 2021</u> <u>OCO</u> -	<u>FY 2021</u> <u>Total</u> 48.449	<u>FY 2022</u> 49.570	<u>FY 2023</u> 26.458	FY 2024 6.063	<u>FY 2025</u> 3.960	<u>Cost To</u> <u>Complete</u> Continuing	<u>Total Cost</u> Continuing

K49020 / Dismounted Hub is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

D. Acquisition Strategy

Dismounted A-PNT program will provide the Soldier conducting operations outside of vehicles the means to maintain accurate position, velocity, and time information in Global Positioning System (GPS) challenged or degraded/denied environments where space based PNT may be limited or denied. The Dismounted A-PNT capability will provide improved performance over the currently fielded Defense Advanced GPS Receiver.

The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units. This will be implemented by utilizing Other Transaction Authority (OTA)'s to competitively obtain prototypes. The Government will conduct laboratory and performance testing. The findings from these efforts will provide technology viability and allow for the transition to limited production. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 120 <i>Naviga</i>	ogram Ele 6120A / A tion and T	ement (N Issured F Iiming (P	l umber/N Positioning NT)	ame) g,	Project FJ9 / Di	(Numbe ismounted	r/Name) d A-PNT		
Management Service	es (\$ in M	lillions)		FY	2019	FY 2	2020	FY : Ba	2021 ase	FY 2	2021 CO	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 Management Support - Contractor	C/CPFF	Various : Various	-	1.435	Dec 2018	1.399	Dec 2019	-		-		-	0.000	2.834	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.306		-		-		-	0.000	1.306	-
		Subtotal	-	1.435		2.705		-		-		-	0.000	4.140	N/A
Product Developme	nt (\$ in M	illions)		FY	2019	FY	2020	FY : Ba	2021 ase	FY 2	2021 CO	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
Dismounted A- PNT Prototyping & Development Vendor 1	C/FFP	Integrated Solutions for Systems, Inc. (IS4S) : Auburn, AL	-	6.112	Feb 2019	2.196	Nov 2019	-		-		-	0.000	8.308	-
Dismounted A- PNT Prototyping & Development Vendor 2	C/FFP	Mayflower Communications Company, Inc : Bedford, MA	-	2.206	Feb 2019	1.193	Nov 2019	-		-		-	0.000	3.399	-
Dismounted A-PNT Protoyping & Delivery	C/FFP	TBD : TBD	-	-		6.928	Feb 2020	-		-		-	0.000	6.928	-
Development of a Dismounted M-Code capable prototype	MIPR	L3 Technologies Interstate Electronics Corporation : Anaheim, CA	-	1.300	Jun 2019	0.727	Feb 2020	-		-		-	0.000	2.027	-
Development of a small SWAP-C multi sensor navigation prototype	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	-	0.896	Nov 2018	-		-		-		-	0.000	0.896	-
Engineering and Technical Product Development	MIPR	C5ISR : Various	-	1.060	Dec 2018	3.247	Dec 2019	-		-		-	0.000	4.307	-

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	021 Arm	ıy								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 120 <i>Naviga</i> t	ogram Ele 6120A I A tion and T	ement (N Assured F Timing (P	lumber/N Positioning NT)	ame) g,	Project FJ9 / D	t (Numbe ismounted	r/ Name) d A-PNT		
Product Developmer	nt (\$ in M	illions)		FY	2019	FY 2	2020	FY : Ba	2021 ase	FY	2021 CO	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
Nett Warrior Integration	MIPR	Various : Various	-	0.783	Jul 2019	1.567	Feb 2020	-		-		-	0.000	2.350	-
	1	Subtotal	-	12.357		15.858		-		-		-	0.000	28.215	N/A
Support (\$ in Million	s)			FY 2	2019	FY 2	2020	FY : Ba	2021 ase	FY	2021 CO	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 Technical Services - Government	Various	C5ISR : Various	-	0.372	Nov 2018	0.725	Nov 2019	-		-		-	0.000	1.097	-
Engineering and Technical Services - Contractor	C/CPFF	DCS Corporation : APG, MD	-	1.120	Jan 2019	0.793	Nov 2019	-		-		-	0.000	1.913	-
		Subtotal	-	1.492		1.518		-		-		-	0.000	3.010	N/A
Test and Evaluation	(\$ in Milli	ions)		FY	2019	FY 2	2020	FY : Ba	2021 ase	FY	2021 CO	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	C/Various	Various : Various	-	0.100	Dec 2018	8.677	Dec 2019	-		-		-	0.000	8.777	-
		Subtotal	-	0.100		8.677		-		-		-	0.000	8.777	N/A
			Prior Years	FY	2019	FY	2020	FY : Ba	2021 ase	FY	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	15.384		28.758		-		-		-	0.000	44.142	N/A
Demonstra															

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021	Army				Date: February	2020
Appropriation/Budget Activity 2040 / 4		R-1 Program Elem PE 1206120A / Ass Navigation and Tim	nent (Number/Name) sured Positioning, hing (PNT)	Project (N FJ9 / Disr	Number/Name) nounted A-PNT	
	- T T	Γ	- I I		1	[]
Event Name	FY 2019 FY	2020 FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Dismounted A-PNT M-Code / SWAP-C Prototypes						
Dismounted A-PNT Prototype Acquisition Decision	M-Code / SWAP-C Prototypes					
Dismounted A-PNT Prototyping & Delivery	Protoyping & Delivery					
Dismounted A-PNT Prototype Testing	Prototyo	e Testing				
Dismounted A-PNT Nett Warrior Integration	Nett Vlarior Integra	ation				

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army				D	ate: Febru	ary 2020
ppropriation/Budget Activity 040 / 4	R-1 Program I PE 1206120A <i>Navigation and</i>	Element (Number I Assured Position d Timing (PNT)	r/ Name) ing,	Project (Nun FJ9 / Dismou	nber/Name Inted A-PN	e) IT
	Schedule Details	5				
	[Sta	art		En	d
Events		Quarter	Year	Qua	arter	Year
Dismounted A-PNT M-Code / SWAP-C Prototypes		1	2019		2	2021
Dismounted A-PNT Prototype Acquisition Decision		2	2019		2	2019
Dismounted A-PNT Prototyping & Delivery		2	2019		2	2021
Dismounted A-PNT Prototype Testing		1	2020		2	2021

<u>Note</u>

Program Element (PE) 1206120A project FJ9 transitions to PE 0604120A project EH8 beginning in FY 2021.

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2021 A	Army							Date: Feb	ruary 2020	
Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 120612 Navigatior	r am Elemen 20A I Assure n and Timing	t (Number/ ed Positioni (PNT)	' Name) ng,	Project (N FK1 / Pseu	umber/Nar udolites	ne)	
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
FK1: Pseudolites	-	0.953	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.953
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bud The Pseudolite project was termi	lget Item J nated by th	ustification e Army on 1	1 12 February	2019.				[1		1	
B. Accomplishments/Planned P	<u>rograms (</u>	\$ in Million	<u>s)</u>					FY 2019	FY 2020	FY 2021 Base	FY 2021	FY 2021 Total
<i>Title:</i> Pseudolites close out								0.953	-	-	-	-
Description: Pseudolites transition	oning to Are	ea Protectio	n and Alterr	ative Navig	gation Tech	nology Deve	elopment.					
			Acco	mplishmer	nts/Planned	d Programs	Subtotals	0.953	-	-	-	-
C. Other Program Funding Sum N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> The Pseudolite project was termi	nated by th	e Army on 1	12 February	2019.								

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	,				R-1 Pro PE 120 <i>Navigat</i>	gram Ele 6120A <i>I A</i> ion and T	ement (N Assured F Timing (Pl	l umber/N Positioning NT)	ame) _{3,}	Project FK1 / Ps	(Numbei seudolites	r/ Name) S		
Support (\$ in Millions	5)			FY 2	2019	FY 2	:020	FY 2 Ba	2021 Ise	FY 2 O(2021 CO	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 Technical Services - Government	MIPR	C5ISR : Various	-	0.953	Dec 2018	-		-		-		-	0.000	0.953	-
		Subtotal	-	0.953		-		-		-		-	0.000	0.953	N/A
			Prior Years	FY	2019	FY 2	020	FY 2 Ba	2021 Ise	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	0.953		0.000		-		-		-	0.000	0.953	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021	Army							Date	: February	2020	
Appropriation/Budget Activity 2040 / 4			R-1 F PE 12 <i>Navig</i>	Program Eleme 206120A <i>I Assu</i> gation and Timir	e nt (Number/Nam ured Positioning, ng (PNT)	e)	Project (I FK1 / Pse	Numbe udolite	er/Name) es		
Γ	1										
Event Name	FY 2019	FY 20)20	FY 2021	FY 2022		FY 2023	F	Y 2024	FΥ	2025
Pseudolite (PL) Prototype Smart Shutdown and Transition	Smart Shutdown & Trans	tion									

hibit R-4A, RDT&E Schedule Details: PB 2021 Army				Date:	February 2020
propriation/Budget Activity 40 / 4	R-1 Program E PE 1206120A / Navigation and	lement (Number Assured Position Timing (PNT)	/ Name) ing,	Project (Number FK1 / Pseudolites	/Name)
	Schedule Details				
		Sta	rt		End
Events		Quarter	Year	Quarter	· Year
		4	2040	4	0040

Exhibit R-2A, RDT&E Project Ju			Date: Febr	uary 2020								
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 120612 Navigation	am Elemen 20A / Assure and Timing	umber/Nan nted A-PNT	ne)				
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
FK2: Mounted A-PNT	-	35.775	59.073	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	94.848
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

<u>Note</u>

Program Element (PE) 1206120A project FK2 transitions to PE 0604120A project EJ2 beginning in FY 2021.

A. Mission Description and Budget Item Justification

Mission Command Network Modernization Implementation Plan - Line of Effort 1, 17 April 2018.

Mounted Assured Positioning, Navigation and Timing System (MAPS) will provide the Army's ground maneuver forces access to assured PNT information under conditions where space-based PNT Global Positioning System (GPS) may be limited or denied. A-PNT products are ruggedized tactical systems which provides electronic protection capabilities that enable combatant commanders the ability to move, shoot, and communicate in a Global Positioning System (GPS) challenged or denied environments. MAPS addresses two critical capability gaps: Access and Integrity. Access is the ability to retrieve accurate PNT information in a contested Electronic Warfare/Cyber environment. Integrity is the ability to trust the PNT data. PNT is a critical enabler of many Army Maneuver, Fire and Command and Control systems that are dependent on accurate Position and Timing.

Mounted Hub A-PNT: The Mounted Assured Positioning, Navigation, and Timing (PNT) System (MAPS) is a platform-mounted, ruggedized tactical PNT system which provides electronic protection capabilities that enable combatant commanders the ability to move, shoot, and communicate in a Global Positioning System (GPS) challenged or denied environments. Included in the MAPS is the Anti-Jam Antenna System (AJAS) which provides GPS signal point protection and PNT Assurance in challenged environments through Anti-Jam technologies. AJAS enables tactical capabilities through assured signal acquisition in challenged environments. The AJAS will assist in delivering distributed assured PNT capabilities to mounted platforms over time in an iterative, affordable manner that allows for future modernization.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2021	FY 2021	FY 2021
	FY 2019	FY 2020	Base	000	Total
<i>Title:</i> Mounted A-PNT System (MAPS)	21.055	56.390	-	-	-
Description: This effort supports the delivery of MAPS prototypes for platform integration, performance and reliability testing, technical evaluation, and operational assessment.					
<i>FY 2020 Plans:</i> FY 2020 Base funds will support integration, installation, training and Soldier assessment of MAPS on selected combat vehicles and command, control and communication systems.					
FY 2020 to FY 2021 Increase/Decrease Statement:					

PE 1206120A: Assured Positioning, Navigation and Timi... Army

				Date: Feb	oruary 2020	
Program Elem 1206120A / Ass vigation and Tim	ent (Number ured Positioni ing (PNT)	/Name) ing,				
		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
21 as it transition	ns to PE					
		14.720	-	-	-	-
		-	2.683	-	-	-
Planned Program	ms Subtotals	35.775	59.073	-	-	-
<u>1 FY 2021</u>					Cost To	
<u>O Total</u>	FY 2022	FY 2023	<u>FY 2024</u>	<u>FY 2025</u>	Complete	Total Cost
6 93.151	81.623	153.841	94.775	97.866	Continuing	Continuing
	Program Elem 1206120A / Ass <i>igation and Tim</i> 21 as it transitio 21 as it transitio 1 FY 2021 2 <u>Total</u> 6 93.151	Program Element (Number/ 1206120A / Assured Positioni igation and Timing (PNT) 21 as it transitions to PE 21 as it transitions to PE Ianned Programs Subtotals 1 FY 2021 0 Total FY 2022 6 93.151 81.623	Program Element (Number/Name) 1206120A / Assured Positioning, igation and Timing (PNT) FY 2019 21 as it transitions to PE 14.720 - Ianned Programs Subtotals 35.775 1 FY 2021 - 1 FY 2021 - 1 FY 2021 - 1 FY 2021 - 1 FY 2021 5 93.151 81.623 153.841	Program Element (Number/Name) Project (N 1206120A / Assured Positioning, FK2 / Moule igation and Timing (PNT) FY 2019 FY 2020 21 as it transitions to PE 14.720 - 14.720 - 2.683 Ianned Programs Subtotals 35.775 59.073 1 FY 2021 FY 2023 FY 2024 93.151 81.623 153.841 94.775	Date: Feb Program Element (Number/Name) Project (Number/Na 1206120A / Assured Positioning, FX 2019 igation and Timing (PNT) FY 2019 FY 2019 FY 2020 Base FY 2019 21 as it transitions to PE FY 2020 14.720 - 2.683 - 2.683 - 1anned Programs Subtotals 35.775 59.073 1 FY 2021 2 Total FY 2022 5 93.151 81.623 153.841	Date: February 2020 Program Element (Number/Name) 1206120A / Assured Positioning, igation and Timing (PNT) FY 2019 FY 2020 FY 2021 FY 2021 FY 2019 FY 2020 Base OCO 21 as it transitions to PE 14.720 - - 14.720 - - - 2.683 - - - 14.720 - - - 14.720 - - - 14.720 - - - 14.720 - - - 14.720 - - - 14.720 - - - 14.720 - - - 14.720 - - - 14.720 - - - 14.720 - - - 14.720 - - - 14.720 - - - 15.775

<u>Remarks</u>

K49030 / Mounted Hub A-PNT is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing

D. Acquisition Strategy

The goal of the Mounted Assured Positioning, Navigation and Timing (PNT) System (MAPS) program is to deliver distributed assured PNT capabilities to mounted platforms over time in an iterative, affordable manner that allows for future modernization. The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units. This will be implemented by utilizing a competitive Other Transaction Agreement (OTA) to obtain prototypes. The Government will conduct Electromagnetic Interference and Environmental Testing, as well as performance testing in the System Integration Lab (SIL), anechoic chamber testing and a Military Feasibility Assessment (MFA). The findings from these tests and assessment efforts will determine whether or not to begin platform integration. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 120 <i>Naviga</i> t	ogram Ele 6120A / A tion and T	ement (N Issured F Timing (Pl	lumber/N Positioning NT)	Project FK2 / M	et (Number/Name) Mounted A-PNT				
Management Service	es (\$ in M	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2	2021 CO	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 Management Support - Contractor	C/CPFF	Various : Various	-	1.381	Jan 2019	1.886	Dec 2019	-		-		-	0.000	3.267	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		2.683		-		-		-	0.000	2.683	-
		Subtotal	-	1.381		4.569		-		-		-	0.000	5.950	N/A
Product Developmer	nt (\$ in M	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2 O(2021 CO	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
Mounted/AJAS Prototype Development Contract	C/FFP	TBD : TBD	-	5.045	Sep 2019	10.247	Jan 2020	-		-		-	0.000	15.292	-
Engineering and Technical Product Development	MIPR	C5ISR : APG, MD	-	4.361	Jan 2019	0.842	Dec 2019	-		-		-	0.000	5.203	-
Client and Platform Integration	MIPR	PEO CS&CSS : Various	-	0.975	Apr 2019	29.293	Nov 2019	-		-		-	0.000	30.268	-
Client Software Development (JBCP)	MIPR	AMRDEC/S3I : APG, MD	-	0.544	Jan 2019	-		-		-		-	0.000	0.544	-
Technical Manuals & Support Equipment	MIPR	C5ISR : APG, MD	-	-		2.753	Dec 2019	-		-		-	0.000	2.753	-
FY 2019 Pending Rescission	TBD	TBD : TBD	-	14.720		-		-		-		-	0.000	14.720	-
Subtotal -				25.645		43.135		-		-		-	0.000	68.780	N/A

Remarks

Client and Platform Integration is required for 81 Platforms and 27 Client PMs.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	021 Arm	У								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 120 <i>Naviga</i> t	ogram Ele 6120A / A tion and T	ement (N Assured F Timing (P	lumber/N Positioning NT)	ame) _{3,}	Project FK2 / N	(Number Nounted A	r/ Name) -PNT		
Support (\$ in Million	s)			FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2 OC	2021 CO	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 Technical Services - Government	MIPR	C5ISR : Various	-	0.639	Nov 2018	0.794	Nov 2019	-		-		-	0.000	1.433	-
Engineering and Technical Services - Contractor	C/CPFF	C5ISR : Various	-	3.498	Nov 2018	4.485	Nov 2019	-		-		-	0.000	7.983	-
		Subtotal	-	4.137		5.279		-		-		-	0.000	9.416	N/A
Test and Evaluation	(\$ in Milli	ons)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2 OC	2021 CO	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
Performance Testing	MIPR	C5ISR : Various	-	1.294	Nov 2018	2.111	Nov 2019	-		-		-	0.000	3.405	-
Reliability Testing	MIPR	C5ISR : Various	-	-		1.327	Feb 2020	-		-		-	0.000	1.327	-
Field Testing	MIPR	Army Test and Evaluation Command (ATEC) : White Sands Missile Range (WSMR)	-	0.415	Nov 2018	-		-		-		-	0.000	0.415	-
Military Feasibility Assessment (MFA)	MIPR	Various : TBD	-	-		2.111	Mar 2020	-		-		-	0.000	2.111	-
Systems Engineering and Integration Testing & Support	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	-	2.903	Oct 2018	0.541	Dec 2019	-		-		-	0.000	3.444	-
	1	Subtotal	-	4.612		6.090		-		-		-	0.000	10.702	N/A
			Prior Years	FY	2019	FY	2020	FY 2 Ba	2021 ase	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	35.775		59.073		-		-		-	0.000	94.848	N/A
<u>Remarks</u> Program Element (PE) 120)6120A proje	ect FK2 transitions to PE	0604120A	v project EJ	2 beginning	in FY 2021.	Program so	hedule cor	ntinues on P	E 0604120A	A project E.	J2.			

PE 1206120A: Assured Positioning, Navigation and Timi... Army UNCLASSIFIED Page 24 of 32

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	vrmy							Date	: February	2020	
Appropriation/Budget Activity 2040 / 4			R-1 Pr PE 12 <i>Naviga</i>	rogram Elemen 06120A / Assurd ation and Timing	i t (Number i ed Positioni g (PNT)	Project (FK2 / Mo	Project (Number/Name) FK2 / Mounted A-PNT				
Event Name	FY 2019	FY 20	20	FY 2021	FY 20	22 4 1	FY 2023	F	Y 2024	FY 20	25
Mounted A-PNT Risk Reduction Activities	Risk Reduction Activities										
Mounted A-PNT Prototyping and Testing - Phase I	Prototyping and Te	sting - Phase I									
Mounted A-PNT Prototyping and Testing - Phase II	P	rototyping and Te	esting - Pha	ase II							
MAPS Technology Insertion - Alt Nav		MAPS T	echnolog y	Insertion - Alt Nav							
Client and Platform Integration	Client ar	nd Platform Integr	ation								
Operational Technical Demonstration		στι									
Direct Requirement Decision Preferred Material Solution		Direct Requi	1 rement Def	cision Preferred Material	Solution						

xhibit R-4A, RDT&E Schedule Details: PB 2021 Army			Date: Fel	oruary 2020
ppropriation/Budget ActivityF040 / 4FNN	R-1 Program Element (Numbe PE 1206120A <i>I Assured Positio</i> Navigation and Timing (PNT)	Project (Number/Na FK2 / Mounted A-PN	ime) IT	
Sche	dule Details			
	St	art		End
Events	Quarter	Year	Quarter	Year
Mounted A-PNT Risk Reduction Activities	1	2019	1	2022
Mounted A-PNT Prototyping and Testing - Phase I	1	2019	4	2019
Mounted A-PNT Prototyping and Testing - Phase II	4	2019	4	2020
MAPS Technology Insertion - Alt Nav	2	2020	3	2021
Client and Platform Integration	3	2019	2	2022
Operational Technical Demonstration	3	2020	3	2020
Direct Requirement Decision Preferred Material Solution	3	2020	3	2020

<u>Note</u>

Program schedule continues on PE 0604120A project EJ2.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2021 A	vrmy							Date: Febr	uary 2020		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 1206120A I Assured Positioning, Navigation and Timing (PNT)Project (Number/Name) FK3 I Anti-Jac						mber/Name) am Antenna		
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2025	Cost To Complete	Total Cost			
FK3: Anti-Jam Antenna	-	8.624	8.900	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	17.524	
Quantity of RDT&E Articles	-	-	-	-	-	-	-						

<u>Note</u>

Program Element (PE) 1206120A project FK3 transitions to PE 0604120A project EJ2 beginning in FY 2021.

A. Mission Description and Budget Item Justification

The Anti-Jam Antenna System (AJAS) provides point protection by steering electronic nulls at interference sources or beams at valid signal sources. This enables continuous Global Positioning System (GPS) signal acquisition and tracking in a navigation warfare (jamming) environment. The AJAS is tightly coupled with the Mounted Assured Positioning, Navigation and Timing System (MAPS) to provide GPS signal protection and assured PNT in challenged environments on Army tactical and combat vehicles. The AJAS integration with the MAPS will achieve performance requirements in the highest threat level conditions. These two products each provide a degree of A-PNT protection. Integrated together, however, these two products will close the capability gap and achieve the desired performance.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<i>Title:</i> Anti-Jam Antenna System	8.259	8.496	-	-	-
Description: This effort supports the delivery of MAPS prototypes for platform integration, performance and reliability testing, technical evaluation, and operational assessment.					
FY 2020 Plans: FY 2020 Base funds will support integration, installation, training and Soldier Assessment of AJAS fielded with MAPS, on selected combat vehicles and command, control and communication systems.					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> RDT&E funding decreased from \$8.9 million in FY 2020 to \$0.0 million in FY 2021 as it transitions to PE 0604120A project EJ2 beginning in FY 2021.					
Title: FY19 Rescission	0.365	-	-	-	-
Description: FY 2019 Pending Rescission					
Title: FY 2020 SBIR/STTR Transfer	-	0.404	-	-	-
Description: Funding transferred in accordance with Title 15 USC ?638					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020				
Appropriation/Budget Activity 2040 / 4	Project (N FK3 / Anti-	umber/Nan Jam Antenr	ne) na			
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						
FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638						
	Accomplishments/Planned Programs Subtotals	8.624	8.900	-	-	-
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A						

<u>Remarks</u>

D. Acquisition Strategy

The goal of the Anti-Jam Antenna System (AJAS) program is to deliver distributed A-PNT capabilities to mounted platforms over time in an iterative, affordable manner that allows for future modernization. The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units. This will be implemented by utilizing a competitive Other Transaction Agreement (OTA) to obtain prototypes. The Government will conduct partial Electromagnetic Interference and Environmental Testing, as well as performance testing in the System Integration Lab (SIL), anechoic chamber testing and a Military Feasibility Assessment. The findings from these test and assessment efforts will determine whether or not to proceed to platform integration. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Pro PE 120 <i>Naviga</i> t	ogram Ele 6120A / A tion and T	ement (N Assured F Timing (Pl	lumber/N Positioning NT)	ame) 1,	Project FK3 / A	(Numbe nti-Jam A	r/Name) Intenna		
Management Service	es (\$ in M	illions)		FY	2019	FY	2020	FY 2 Ba	2021 ase	FY	2021 CO	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 Management Support - Contractor	C/CPFF	Various : Various	-	0.338	Jan 2019	0.218	Dec 2019	-		-		-	0.000	0.556	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.404		-		-		-	0.000	0.404	-
	-	Subtotal	-	0.338		0.622		-		-		-	0.000	0.960	N/A
Product Developmer	nt (\$ in Mi	illions)		FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY :	2021 CO	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 of the Systems Engineering and Integration Lab	MIPR	CERDEC Command Power and Integration Lab : APG, MD	-	-		0.209	Dec 2019	-		-		-	0.000	0.209	-
Engineering and Technical Product Development	MIPR	C5ISR : APG,MD	-	1.970	Jan 2019	-		-		-		-	0.000	1.970	-
Mounted and AJAS Prototype Development Contract	C/FFP	TBD : TBD	-	2.231	Sep 2019	-		-		-		-	0.000	2.231	-
Client Software Development (JBCP)	MIPR	AMERDEC/S3I Directorate : APG,MD	-	-		3.263	Nov 2019	-		-		-	0.000	3.263	-
Technical Manuals & Support Equipment	MIPR	C5ISR : APG,MD	-	-		2.925	Dec 2019	-		-		-	0.000	2.925	-
FY 2019 Pending Rescission	TBD	TBD : TBD	-	0.365	May 2019	-		-		-		-	0.000	0.365	-
		Subtotal	-	4.566		6.397		-		-		-	0.000	10.963	N/A
Technical Manuals & Support Equipment FY 2019 Pending Rescission	MIPR	C5ISR : APG,MD TBD : TBD Subtotal	-	- 0.365 4.566	May 2019	2.925 - 6.397	Dec 2019	-		-		-	0.000	2.925 0.365 10.963	

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	021 Arm	у								Date:	February	2020	
Appropriation/Budge 2040 / 4	t Activity	,				R-1 Pro PE 120 <i>Naviga</i> t	ogram Ele 6120A / A tion and Ti	ment (N ssured F iming (Pl	l umber/N Positioning NT)	ame) _{7,}	Project FK3 / A	t (Numbe i <i>nti-Jam A</i>	r/ Name) ntenna		
Support (\$ in Millions	5)			FY 2	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2 O(2021 CO	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 Technical Services - Government	MIPR	C5ISR : Various	-	0.034	Dec 2018	0.063	Nov 2019	-		-		-	0.000	0.097	-
Engineering and Technical Services - Contractor	C/CPFF	C5ISR : Various	-	2.076	Jan 2019	1.818	Nov 2019	-		-		-	0.000	3.894	-
		Subtotal	-	2.110		1.881		-		-		-	0.000	3.991	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2 Ba	2021 ase	FY 2 O(2021 CO	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
Live Sky Demo and Antenna Anechoic Chamber Test	MIPR	CERDEC - Command Power and Integration Directorate : APG, MD	-	0.384	Dec 2018	-		-		-		-	0.000	0.384	-
Anti-Jam Antenna Integrity/ Performance Testing	MIPR	CERDEC STCD : APG,MD	-	1.098	Nov 2018	-		-		-		-	0.000	1.098	-
TNT Prototype testing	MIPR	CERDEC STCD : APG, MD	-	0.128	Nov 2018	-		-		-		-	0.000	0.128	-
		Subtotal	-	1.610		-		-		-		-	0.000	1.610	N/A
Prior Years				FY	2019	FY 2	2020	FY 2 Ba	2021 ase	FY 2 OC	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals -						8.900		-		-		-	0.000	17.524	N/A

Remarks

Program Element (PE) 1206120A project FK3 transitions to PE 0604120A project EJ2 beginning in FY 2021. Program schedule continues on PE 0604120A project EJ2.

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy								Date	: February	2020
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (IPE 1206120A / Assured Positioning, Navigation and Timing (PNT)FK3 / Ant						Numbe i-Jam J	er/Name) Antenna		
Event Name	FY 2019	FY 20	20	FY 2021	_	FY 2022		FY 2023		FY 2024	FY 2025
Anti-Jam Antenna Risk Reduction Activities	1 Z J 4	1 Z 3	4	<u>1 Z 3 </u>	4			2 3 4		2 3 4	1 2 3 4
Anti-Jam Antenna Prototyping and Testing - Phase I	Prototyping and Te	sting Phase I									
Phase I OTA Prototype Testing	Phase I OTA										
Antenna Anechoic Chamber Test Integrity/Performance Testi	ng Integrity/Per	iormance Testing									
Directed Requirement Decision Preferred Material Solution		Directed Rec		ecision Preferred N	lateri	al Solution					
Live Sky Demo	Live Sky Demo										
Anti-Jam Antenna Prototyping and Testing - Phase II	P	rototyping and Te	esting Phas	e II							
MAPS/AJAS Technology Insertion - Alt Nav		MAPS/A	JAS Techr	ology Insertion - Al	t Nav	r					
						I	1		1		I

hibit R-4A, RDT&E Schedule Details: PB 2021 Army				Da	te: Februa	ary 2020
propriation/Budget Activity 40 / 4	R-1 Program E PE 1206120A / Navigation and	Iement (Number Assured Position Timing (PNT)	Project (Numl FK3 / Anti-Jam	(Number/Name) ti-Jam Antenna		
	Schedule Details					
		Sta	rt		End	 I
Events		Quarter	Year	Quar	rter	Year
Anti-Jam Antenna Risk Reduction Activities		1	2019	1		2022
Anti-Jam Antenna Prototyping and Testing - Phase I		1	2019	4		2019
Phase I OTA Prototype Testing		3	2019	4		2019
Antenna Anechoic Chamber Test Integrity/Performance Testing		3	2019	4		2019
Directed Requirement Decision Preferred Material Solution		3	2020	3	;	2020
Live Sky Demo		1	2019	2	2	2019
Anti-Jam Antenna Prototyping and Testing - Phase II		4	2019	4		2020
MAPS/AJAS Technology Insertion - Alt Nav		2	2020	3	,	2021

<u>Note</u>

Program schedule continues on PE 0604120A project EJ2.

Exhibit R-2, RDT&E Budget Item	n Justificat	i on: PB 202	21 Army								Date: February 2020		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 1206308A / Army Space Systems Integration								
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost	
Total Program Element	-	45.420	104.996	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing	
FE5: Space And Missile Defense Integration	-	24.326	104.996	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing	
FE6: Army Space System Enhancement/Integration	-	21.094	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.094	

A. Mission Description and Budget Item Justification

This Program Element (PE) funds space systems integration efforts performed by the US Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT) and the Program Executive Office for Intelligence, Electronic Warfare (PEO IEW&S) to develop and field space superiority capabilities.

Project FE5: Funds USASMDC/ARSTRAT to integrate warfighting concepts and technologies, validate concepts, and identify capabilities needed to implement the validated concepts, and develop DOTMLPF solutions to realize those space and high altitude related capabilities. Provide engineering support to the Joint Friendly Force Tracking (J-FFT) Mission Management Center (MMC) through an associated test-bed for both operational and developmental injection and integration of real-time J-FFT information into the Common Operating Picture (COP) for Combatant Commanders (CCMDs), Joint Task Forces (JTFs), and Coalition Partners. The MMC injects real-time J-FFT information into the COP for CCMDs, JTFs and Coalition partners. USSTRATCOM, in accordance with CJCSI 3910.01 (reference V.4.) is designated one of three coordinating agencies for J-FFT within DoD. CJCSI 3910.01 directs eight Force Modernization tasks to USSTRATCOM. USSTRATCOM SI 534-5 (reference V.6.) and annually published USSTRATCOM operations orders have designated USASMDC/ARSTRAT as the lead USSTRATCOM component command for Friendly Force Tracking (FFT).

Project FE6: Details of this program are reported in accordance with Title 10, United States Code, Section 119 (a)(1).

B. Program Change Summary (\$ in Millions)	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	FY 2021 OCO	FY 2021 Total
Previous President's Budget	38.307	104.996	23.168	-	23.168
Current President's Budget	45.420	104.996	0.000	-	0.000
Total Adjustments	7.113	0.000	-23.168	-	-23.168
 Congressional General Reductions 	-	-			
 Congressional Directed Reductions 	-	-			
 Congressional Rescissions 	-	-			
 Congressional Adds 	-	-			
 Congressional Directed Transfers 	-	-			
Reprogrammings	7.113	-			
SBIR/STTR Transfer	-	-			
Adjustments to Budget Years	-	-	-23.168	-	-23.168
PE 1206308A: Army Space Systems Integration	UNC	CLASSIFIED			
Army	F	age 1 of 14	R-1 Lir	ne #117	720

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 I BA 4: Advanced	PE 1206308A I Army Space Systems Integration	
Component Development & Prototypes (ACD&P)		

Change Summary Explanation

FY2020 FWC direct funding (\$14.62M) supports the assured position, navigation and timing cross functional team (APNT CFT) Low Earth Orbit tactical space layer strategy (\$58.776M); capability development support to the assured APNT CFT efforts to develop PNT situational awareness, develop alternative PNT sources and deny adversary use of PNT (\$20.0M); and, TF EAGLE's execution of Consolidated SATCOM System Expert (CSS-E) System Tool (\$11.6M). The overall FWC decrease is a function of balancing between the FWC and APNT CFT funding for FY2020. Once Project FE5 funding transfers to Project 990 in FY2021 (see separate 990 R-Form), FWC is expected to realize an increase of \$2.789M for the APNT bridging effort plus fact-of-life inflationary adjustments.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army												Date: February 2020		
Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) 2040 / 4 PE 1206308A / Army Space Systems FE5 / Space And Miss Integration Integration Integration								umber/Nan e And Miss	1e) ile Defense					
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		
FE5: Space And Missile Defense Integration	-	24.326	104.996	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				

<u>Note</u>

This project transitions to 0603308A / 990.

A. Mission Description and Budget Item Justification

The Friendly Force Data Integration and Management (FFDIM) Capability Definition Package (CDP), a Joint Capabilities Integration and Development System (JCIDS) requirements document (October 2017) validated the Joint Friendly Force Tracking (JFFT) Testbed's development, testing and integration capabilities and Friendly Force Tracking (FT) System Expert support provided by U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT) as U.S. Strategic Command's (USSTRATCOM's) Army Service Component Command (ASCC). In addition, Chairman of the Joint Chiefs of Staff Instruction 3910 (FFT Operations Guidance) directs USSTRATCOM's ASCC to execute eight specified FFT mission support responsibilities that include providing a testing and development capability to support joint, interagency and coalition partners FFT operations. USASMDC/ARSTRAT: Headquarters, Department of the Army General Order 37, dated 16 October 2006, designated USASMDC/ARSTRAT as the Army proponent for space, the Army integrator for global missile defense (GMD), and the Army Service Component Command (ASCC) of the USSTRATCOM. Army Regulation (AR) 10-87, Army Commands, Army Service Component Commands, and Direct Reporting Units, dated 4 September 2007, and AR 5-22, The Army Force Modernization Proponent System, dated 19 August 2009, designated USASMDC/ARSTRAT as the Army specified proponent for Space/High Altitude capabilities. As the Army proponent for space and high altitude, USASMDC/ARSTRAT is responsible for developing warfighting concepts, conduct warfighting experiments to validate those concepts, identify capabilities needed to implement the validated concepts, and develop Doctrine, Organizations, Training, Material, Leadership & Education, Personnel, Facilities and Policy (DOTMLPF-P) solutions.

Project FE5 funds USASMDC/ARSTRAT efforts to develop, analyze and mature warfighting concepts, and conduct warfighting experiments for space and high altitude capabilities. USASMDC/ARSTRAT is the proponent for space/high altitude capabilities and is responsible for determining and integrating DOTMLPF-P for the Army. The program also funds development and integration of new data sources and services into the JFFT Mission Management Center (MMC), providing users FFT information system services at the highest Mission Assurance Category level (MAC 1). Software products developed and deployed by the JFFT Testbed into the MMC enable the receipt, integration and dissemination of real-time FFT information to the Common Operating Picture (COP) displays for Combatant Commanders, Joint Task Forces and coalition partners. JFFT Subject Matter Expert support to critical FFT interoperability assessments and development activities with coalition partners are supporting DOD's priority of strong alliances and partnerships. Integrated FFT data solutions developed by JFFT Testbed enable FFT data for COP display and Situational Awareness between Army forces and Unified Action Partners. The JFFT Testbed will continues to leverage FFT systems expertise and reduce Department of Defense costs by supporting numerous efforts, including the joint Personnel Recovery community response to a Joint Urgent Operational Needs Statement to resolve critical issues in isolated persons reporting and locating.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206308A <i>I Army Space Systems</i> <i>Integration</i>	Project (N FE5 / Spac Integration	Imber/N e And N	lame) Iissile Defense	е
B. Accomplishments/Planned Programs (\$ in Millions)	R-2A, RDT&E Project Justification: PB 2021 Army Pate: February 2020 riation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name) PL FE51 Space And Missile Defense Integration Project (Number/Name) project (Number/Name) FY 2019 FY 2020 F project (Number/Name) FY 2019 FY 2019 FY 2020 F project (Number/Name) FY 2019 FY 2019 FY 2020 F project (Number/Name) FY 2019 FY 2019 FY 2020 F project (Number/Name) FY 2019 FY 2019 FY 2019 FY 2020 F project (Number/Name) FY 2019 Greace systems, space control capabilities, missile defense, and high altitude systems. For project Name 8.797 otion of space systems, space control capabilities are drighting concepts within the space and high altitude domains in Joint/ Interservice forums, Plan and execute wargames to evaluate emerging concepts within the space and high altitude domains in Joint/ <td< th=""></td<>				
Title: Architecture Development, Wargames and Demonstrations			10.440	8.797	-
Description: Funding is provided for planning, developing, and executing arc Army integration of space systems, space control capabilities, missile defense	hitectures and combat development solutions f e, and high altitude systems.	or			
FY 2020 Plans: Expand upon FY 2019 developments to plan, develop, and execute architecturintegration of space systems, space control capabilities, and high altitude systems and high altitude systems. Program Assessments, represent Army positions and defend Army equities reprosed and inter-Service forums. Plan and execute wargames to evaluate emergedomains as well as participate and provide support to Army and Joint wargame capabilities and technologies can be integrated and evaluated in the most real space, high altitude and cyber capability gaps are identified and capabilities at these capabilities is explored and where possible, exploited. Develop space mof future space and high altitude warfighting concepts. USASMDC/ARSTRAT to enhance the resiliency and effectiveness of critical space-based assets and superiority, high altitude persistent platforms, nano-satellites and tactical laune JCIDS documents including Initial Capabilities Documents or Capability Devel Documents (CPD) to update system Operational Requirements Documents. develop the JCIDS documentation required to Integrate space and high altitude USASMDC/ARSTRAT Future Warfare Center will execute these funds in FY 2000.	int/ e ude hat of n orts ace de to DTF).				
FY 2020 to FY 2021 Increase/Decrease Statement: Funds decreased as FE5 restructured to PE 0603308A 990 in FY 2021			0.500		
Inte: Joint Friendly Force Tracking (J-FFT) Testbed		h = 4	2.526	1.487	-
Commanders' FFT and Hostile Force Tagging, Tracking, and Locating (HF TT and control network architectures, leveraging network enabled command and support development of FFT capabilities for deployed and coalition forces.	(J-F-F) Testbed to develop and integrate Com (L) requirements into existing and future comm control system enhancements, and continuing	bat and to			
FY 2020 Plans: The JFFT Testbed will provide agile capabilities development and integrated s interoperable force tracking data exchange and satisfy joint, agency and coali Operational Picture (COP) displays and decision making. JFFT development	solutions to validated requirements that enable tion warfighting needs for timely, accurate Com will continue to respond to the growth in FFT de	mon evice			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: F	ebruary 2020)	
Appropriation/Budget Activity 2040 / 4	Project (N FE5 / Spa Integration	Project (Number/Name) FE5 I Space And Missile Defense Integration			
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2019	FY 2020	FY 2021
use by enabling the number of device types supported by the MMC and increase operational deployment to the Joint Force Tracking Mission MMC's 24/7 data s and deliver new capabilities including command and control messaging, new date message standard for FFT. Also planned is the re-design and implementation of product, fulfilling requirements for added functionality in data visualization and reduce costs. JFFT Testbed will remain a key contributor to support North Atlar and other coalition assessments and exercises that advance US and coalition for Warfare Center will execute these funds in FY 2020.	s. For evelop FO eb kpand and vities uture				
FY 2020 to FY 2021 Increase/Decrease Statement: Funds decreased as FE5 restructured to PE 0603308A 990 in FY 2021					
<i>Title:</i> Organizational Development as Part of the SRC40 Proponecy Mission		1.450	0.312	-	
Description: Continue participation in the Force Design Update (FDU) process (O&O) Concept Papers, Organization Design Papers, Cost Benefit Analyses, U Requirements Criteria (MARC) determination.	s. Development of Operational & Organization Init Reference Sheets (URS), and Manpower	nal			
FY 2020 Plans: Continue to participate in the Force Design Update (FDU) process. The U.S. A Army Forces Strategic Command (USASMDC/ARSTRAT) Space and Missile D participate in the recurring process used to gain HQDA approval of organization FDU and FDU Jr. processes. This includes the development of Operational & C Design Papers, Cost Benefit Analyses, Unit Reference Sheets, and Manpower in the Total Army Analysis (TAA), the Army's annual process to examine the pr USASMDC/ARSTRAT will support TAA Rule of Allocation development, Capate ensure SRC40 units are properly accounted for in the future Program Objective to analyze the projected Army Force against future demands and levels of fund USASMDC/ARSTRAT SMDCOE will review the USASMDC/ARSTRAT Troops documents conducted as part of a cyclic process as well when needed during or Plan (BOIP) Modernization Path (MODPATH) reviews, Notification of Change r Integrating System (SLAMIS) reviews, etc.). Participate in BOIP Development. including the cyclic review of Army-wide BOIPs under development, development proponent item BOIPs, and validation of BOIP MODPATHs to USASMDC/ARS	e pate ively. es to med ments ssue nd s				

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: Fe	ebruary 2020		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206308A <i>I Army Space Systems</i> <i>Integration</i>	Project (N FE5 / Spac Integration	umber/N ce And M	r /Name) Missile Defense		
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2019	FY 2020	FY 2021	
Analysis, and Solutions Analysis to identify and document organizational base list of those gaps, and identify potential materiel and/or non-materiel solutions. execute these funds in FY 2020.	d capability needs and gaps, develop a prioriti USASMDC/ARSTRAT Future Warfare Center	zed ^r will				
FY 2020 to FY 2021 Increase/Decrease Statement: Funds decreased as FE5 restructured to PE 0603308A 990 in FY 2021						
Title: Position, Navigation, and Timing Navigation Warfare (PNT/NAVWAR)			2.410	1.072	-	
Description: Identifying and advocating for positioning, navigation, and timing requirements through CDR USSTRATCOM to the Joint Staff to establish and f Joint Capabilities Integration and Development System (JCIDS) process. Contron NAVWAR emerging requirements through Commander, U.S. Strategic Commander, U.S. Strategic Commander, U.S. Strategic Commander, NAVWAR requirements, in the JCIDS process and supporting the Army Assume Functional Team by conducting required capability analysis and developing JC PNT, Navigation Warfare, and Space. USASMDC/ARSTRAT Future Warfare Commander, U.S. Strategic Commander, NAVWAR emerging requirements through Commander, U.S. Strategic Commander, NAVWAR emerging requirements in the ICIDS process. Support the Army Assured Strategic Commander, NAVWAR emerging requirements in the ICIDS process.	(PNT) and Navigation Warfare (NAVWAR) formalize joint NAVWAR requirements, in the inuing to identify and advocate for PNT and and to the Joint Staff to establish and formalize ed Positioning Navigation and Timing (APNT) CIDS documents for its three Lines of Effort: As Center will execute these funds in FY 2020.	e joint Cross ssured				
Functional Team by conducting required capability analysis and developing JC APNT Situational Awareness.	CIDS documents for APNT Enabling systems a	nd				
FY 2020 to FY 2021 Increase/Decrease Statement: Funds decreased as FE5 restructured to PE 0603308A 990 in FY 2021						
Title: Narrowband C-SSE enterprise level capability to monitor, detect, and as	sess UHF SATCOM interference		-	10.862	-	
Description: Developing and deploying Narrowband Consolidated SATCOM S allow the U.S. Army to fight SATCOM. The USASMDC/ARSTRAT NB C-SSE interference (EMI) mission in support of CCMDs, Services, Agencies, and War provide NB EMI management and Space Situation Awareness. Once fully developed and, this will improve the joint commander's ability to "fight SATCOM" in a compared to the provide of the provide the pr	System Expert (C-SSE) SATCOM Tools that w Division executes the SATCOM electromagne fighters. Two critical elements of that support veloped and operational, coupled with a sustai itested environment.	rill etic are to nment				
FY 2020 Plans: Fully develop and deploy Narrowband C-SSE SATCOM Tools that will allow th ARSTRAT NB C-SSE Division executes the SATCOM electromagnetic interfer	e U.S. Army to fight SATCOM. The USASMI rence (EMI) mission in support of CCMDs, Ser	DC/ vices,				

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020				
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206308A <i>I Army Space Systems</i> <i>Integration</i>	Project (N FE5 / Spa Integration	е			
B. Accomplishments/Planned Programs (\$ in Millions)		F	í 2019	FY 2020	FY 2021	
Agencies, and Warfighters. Two critical elements of that support are to provid Awareness. Once fully developed and operational, coupled with a sustainme to "fight SATCOM" in a contested environment. USASMDC/ARSTRAT will ex	de NB EMI management and Space Situation Int plan, this will improve the joint commander's recute these funds in FY 2020.	ability				
FY 2020 to FY 2021 Increase/Decrease Statement: No funding in FY 2021.						
Title: Low Earth Orbit Strategy			7.500	78.039	-	
Description: A dedicated constellation of small satellites to provide resilient, in current reconnaissance, surveillance, and target acquisition (RSTA) and PI locate targets of interest in denied and contested environments actionable to Management, Command and Communication (BMC2) capability required to t to enhance, analyze, and disseminate this data to the tactical warfighter via e Sensor-to-Shooter demonstrations directly supporting Long Range Precision	persistent LEO capability to address shortfalls NT systems. Provides the ability to identify and the tactical warfighter. This includes the Battle ask payloads and fuse data, as well as algorith xisting Army systems and networks in support Fires (LRPF).	ns of				
 FY 2020 Plans: Low Earth Orbit (LEO) Strategy Begin validation of demonstration constellation in a realistic operational environment and communications technologies to identify and locate targets of interest in a tactical warfighter. Amount of this effort in FY 2020 - 59,500. Title: APNT Integrated Space Communications Description: Development of a unique advanced space communications capa communications technologies and concepts utilizing bi-static Radio Frequence frequency, phase, and power management. This space communications capa advanced Army LEO space communications concepts and will also assess in communication missions. FY 2020 Plans: Assess performance of space communications capabilities of communications concepts and interfacing with multiple Joint Services. FY 2020 	onment. Evaluate the integrated RSTA, PNT, B denied and contested environments actionable ability to explore advanced ground based space by (RF) scattering and propagation with precisio ability will develop and demonstrate multiple aterfacing with multiple Joint Service space f multiple advanced Army LEO space 20 Amount 20,000	MC2, to the n				
FY 2020 to FY 2021 Increase/Decrease Statement: Funds decreased as FE5 restructured to PE 0604035A BX7 in FY 2021						
Title: FY 2020 SBIR/STTR Transfer			-	4.427	-	
Description: Funding transferred in accordance with Title 15 USC ?638						
FY 2020 Plans:						

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: F	ebruary 2020)
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 1206308A <i>I Army Space Systems</i> <i>Integration</i>	Proje FE5 / Integr	e		
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2019	FY 2020	FY 2021
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 Sub	ototals	24.326	104.996	-
C. Other Program Funding Summary (\$ in Millions) N/A Remarks N/A D. Acquisition Strategy N/A					

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2021 Army	/								Date:	February	2020	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (Number/Name)PE 1206308A / Army Space SystemsFE5 / Space And Missile DefenseIntegrationIntegration									
Management Service	es (\$ in M	lillions)		FY2	2019	FY 2	:020	FY 2 Ba	2021 Ise	FY 2021 OCO		FY 2021 Total]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Personnel and operations support.	TBD	SMDC/ARSTRAT Huntsville, AL and Colorado Springs : SMDC/ARSTRAT Huntsville, AL and Colorado Springs	-	16.826		6.250		-		-		-	0.000	23.076	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		4.427		-		-		-	0.000	4.427	-
		Subtotal	-	16.826		10.677		-		-		-	0.000	27.503	N/A
Product Developmer	nt (\$ in M	illions)		FY	2019	FY 2	020	FY 2 Ba	2021 Ise	FY 2 OC	2021 CO	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
Contracts for Experiments & technology enhancements of prototypes/tools and analysis	Various	SMDC/ARSTRAT Huntsville, AL and Colorado Springs : SMDC/ARSTRAT Huntsville, AL and Colorado Springs	15.655	-		17.018		-		-		-	0.000	32.673	-
Low Earth Orbit	C/Various	Various : Huntsville AL, Wilmngton, MA, Boulder CO, VA	-	7.500		77.301		-		-		-	0.000	84.801	-
		Subtotal	15.655	7.500		94.319		-		-		-	0.000	117.474	N/A
			Prior Years	FY	2019	FY 2	:020	FY 2 Ba	2021 Ise	FY 2	2021 CO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	15.655	24.326		104.996		-		-		-	0.000	144.977	N/A
Remarks															

Exhibit R-4, RDT&E Schedule Profile: PB 2021 A	rmy						Date: February	2020			
Appropriation/Budget Activity 2040 / 4		R-1 P PE 12 Integr	Program Elemen 206308A / Army ration	lumber/Name) ce And Missile Defense า							
–	FY 2019	FY 20	20	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025			
Event Name	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4			
Development of SMDC MMC Force Tracking											
Jericho Thunder Analysis Support											
SMDC NanoSat Analysis (SNAP, KE)											
Space Superiority Joint Architecture Analysis											
Force Design Assessment of Army Forces											
NAVWAR/PNT Gap Analysis and Advocacy											
Implications of the Emerging "Third" Offset Strategy for SMDC S											
Space Simulation Support to TRADOC ARCIC Experimentation											
Common Ground Station Operating Concept and Requirement I											
NAVWAR Defense/Attack Operating Concepts and Requirement											
Army Enduring JFFT Development											
High Altitude Persistent Platform Capability Development Docu											
NAVWAR/PNT in Denied Environment											

Appropriation/Budget Activity Proteyram Element (Number/Name) Intervention Protext Name Protex	Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army												Date: February 2020																	
Presidential strain the strain th	Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name)Project (NPE 1206308A / Army Space SystemsFE5 / SpaceIntegrationIntegration											lumber/Name) ce And Missile Defense n											
Event Name 1 2 3 4 1	E	Y 2	2019	Τ		FY 2	2020	020 FY 2021					FY 2022					FY	202	3		FY 2024					FY 2	2025	5	
Space Superiority Capability Development Image: Space Appendix on Space Ap	Event Name	1	2	3	4	1	2	3	4 1	2	3	3 4	1	2	2	3	4	1	2	3	4	1	2	3	4		1	2	3	4
Counter ISR Capability Development Image: Counter ISR Capability Development Image: Counter ISR Capability Development Space Operations Multi-Domain Environment Analysis Image: Counter ISR Capability Development Image: Counter ISR Capability Development ICEWS Study Image: Counter ISR Capability Development Image: Counter ISR Capability Development Image: Counter ISR Capability Development High Attitude Impacts on Ground Effectiveness Study Image: Counter ISR Capability Development Image: Counter ISR Capability Development Image: Counter ISR Capability Development NAVWAR Attack Study Image: Counter ISR Capability Development Image: Counter ISR Capability Development Image: Counter ISR Capability Development APNT CFT Analysis Support Image: Counter ISR Capability Development (ISWF) Analysis Support Image: Counter ISR Capability Development Image: Counter ISR Capability Development Guide Development (ISWF) Analysis Support Image: Counter ISR Capability Development (ISWF) Analysis Capabi	Space Superiority Capability Development																													
Space Operations Multi-Domain Environment Analysis Image: Space Operations Study Image: Space O	Counter ISR Capability Development																													
ICEWS Study ICEWS Study High Alttude Impacts on Ground Effectiveness Study ICEWS NAVWAR Characterization Study ICEWS NAVWAR Attack Study ICEWS Psuedolite Performance Analysis ICEWS APNT CFT Analysis Support ICEWS Joint Space Warfighting Forum (JSWF) Analysis Support ICEWS Support of the APN/CFT ICEWS Ow Earth Orbit ICEWS	Space Operations Multi-Domain Environment Analysis																													
High Altitude Impacts on Ground Effectiveness Study Image: Study NAVWAR Characterization Study Image: Study NAVWAR Attack Study Image: Study Psuedolite Performance Analysis Image: Study APNT CFT Analysis Support Image: Study Joint Space Warfighting Forum (JSWF) Analysis Support Image: Study Group of the APN/CFT Image: Study Ow Earth Orbit Image: Study	ICEWS Study																													
NAVWAR Attack Study Psuedolite Performance Analysis APNT CFT Analysis Support Joint Space Wardinghting Forum (JSWF) Analysis Support Support of the APN/CFT Ow Earth Orbit	High Altitude Impacts on Ground Effectiveness Study																													
NAVWAR Attack Study Psuedolite Performance Analysis APNT CFT Analysis Support Joint Space Warfighting Forum (JSWF) Analysis Support Support of the APN/CFT Ow Earth Orbit	NAVWAR Characterization Study																													
Psuedolite Performance Analysis APNT CFT Analysis Support Joint Space Warfighting Forum (JSWF) Analysis Support Support of the APN/CFT Ow Earth Orbit	NAVWAR Attack Study																													
APNT CFT Analysis Support APNT CFT Analysis Support Joint Space Warfighting Forum (JSWF) Analysis Support Support of the APN/CFT Ow Earth Orbit	Psuedolite Performance Analysis																													
Joint Space Warfighting Forum (JSWF) Analysis Support Support of the APN/CFT Ow Earth Orbit	APNT CFT Analysis Support																													
Support of the APN/CFT Ow Earth Orbit	Joint Space Warfighting Forum (JSWF) Analysis Support																													
Ow Earth Orbit	Support of the APN/CFT																													
	Ow Earth Orbit																													

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020							
Appropriation/Budget Activity R 2040 / 4 P Ir	-1 Program Element (Numbe E 1206308A / Army Space System Integration	er/Name) stems	Project (Number/Name) FE5 <i>I Space And Missile Defense</i> <i>Integration</i>						
Sche	dule Details								
	St	art	End						
Events	Quarter	Year	Quarter	Year					
Development of SMDC MMC Force Tracking	1	2018	4	2020					
Jericho Thunder Analysis Support	1	2019	4	2020					
SMDC NanoSat Analysis (SNAP, KE)	1	2019	4	2020					
Space Superiority Joint Architecture Analysis	1	2018	4	2020					
Force Design Assessment of Army Forces	1	2019	4	2020					
NAVWAR/PNT Gap Analysis and Advocacy	1	2018	2	2020					
Implications of the Emerging "Third" Offset Strategy for SMDC Space	1	2019	4	2020					
Space Simulation Support to TRADOC ARCIC Experimentation	1	2018	4	2020					
Common Ground Station Operating Concept and Requirement Document	1	2019	3	2020					
NAVWAR Defense/Attack Operating Concepts and Requirements Document	ation 1	2018	4	2020					
Army Enduring JFFT Development	1	2018	4	2020					
High Altitude Persistent Platform Capability Development Document	1	2018	4	2020					
NAVWAR/PNT in Denied Environment	1	2019	2	2020					
Space Superiority Capability Development	1	2018	4	2020					
Counter ISR Capability Development	3	2017	4	2020					
Space Operations Multi-Domain Environment Analysis	4	2017	4	2020					
ICEWS Study	4	2018	4	2019					
High Altitude Impacts on Ground Effectiveness Study	4	2018	4	2019					
NAVWAR Characterization Study	4	2018	4	2019					
NAVWAR Attack Study	4	2019	4	2020					
Psuedolite Performance Analysis	2	2019	1	2020					
APNT CFT Analysis Support	3	2018	4	2020					

Exh	ibit R-4A, RDT&E Schedule Details: PB 2021 Army	Date: Feb	Date: February 2020					
App 204	oropriation/Budget Activity 0 / 4	R-1 Program PE 1206308A Integration	Element (Numbe I Army Space Sys	Number/Nar Ice And Miss n				
			Sta	art		E	nd	
	Events		Quarter	Year		Quarter	Year	
	Joint Space Warfighting Forum (JSWF) Analysis Support		1	2018		4	2020	
	Support of the APN/CFT		1	2018		4	2020	
	Ow Earth Orbit		1	2020		4	2020	
UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 1206308A <i>I Army Space Systems</i> <i>Integration</i>				Project (Number/Name) FE6 <i>I Army Space System Enhancement/</i> <i>Integration</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
FE6: Army Space System Enhancement/Integration	-	21.094	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.094
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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